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NORTHERN DISTRICT OF OHIO
EASTERN DIVISION
CLEVELAND, OHIO

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TRACK THREE CASES	
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	Tuesday, May 17, 2022

TRANSCRIPT OF PHASE II ABATEMENT BENCH TRIAL PROCEEDINGS

HELD BEFORE THE HONORABLE DAN AARON POLSTER

SENIOR UNITED STATES DISTRICT JUDGE

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- - -

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TUESDAY, MAY 17, 2022, 8:32 A.M.

THE COURT: Good morning everyone, please be seated.

Good morning, Doctor. You are still under oath from yesterday.

THE WITNESS: I understand.

THE COURT: You may proceed, Mr. Lanier.

MR. LANIER: Thank you. May it please the Court:

Your Honor, thank you again for another day.

CROSS-EXAMINATION OF DANIEL KESSLER

BY MR. LANIER:

Q Sir, yesterday I road mapped you, we were on the what's missing stop. I want to pick up where we left off, okay?

A Yes.

Q Great. Now, I was challenging whether or not you had fully divulged the extent of potential conflicts in your paper, and you said that you would go back and get the whole paper that shows the full disclosure. Do you remember that dialog?

A Yes.

Q And did you have a chance to go back and actually pull the paper itself?

A Yes.

Q And so if I put up here CT311, this is your paper, The Effects of Medicare Advantage on Opioid Use, correct?

A Yes, that's the working paper version.

Q Yes. And this is the working paper version that has the references that I used yesterday that failed to show your work on behalf of Purdue, remember?

A Yes. I wasn't working on the Purdue matter when I wrote this paper.

Q I understand that, sir. This is past tense. We talked about the past tense previously; has served, received, has received. I'm sure you weren't doing your speaking at that moment as well. Do you see where it says "past tense"?

A Yes. That's not the standard for disclosure that's used.

Q By you?

A No, by the NBER or by the journals.

Q Let's continue to look, sir, because ultimately this paper gets published in *The Journal of Health Economics* and there's a written version, correct?

A Yes.

Q And this is the version that has in the back an acknowledgment section, true?

A Yes.

Q And in the acknowledgment section it's got for Baker,

it's got for Bundorf, who's received the consulting fees from Quinn Emanuel, true?

A Yes.

Q And it's got you, Kessler. Do you see that?

A Yes.

Q Says that you, Kessler, has received speaking and consulting fees from insurers, integrated delivery systems, and other providers of and investors in medical products and services, including the distributor defendants in the National Prescription Opiate Litigation. Do you see that?

A Yes.

Q It does not say anything about Purdue for a manufacturer or a maker like we saw in the disclosure of Dr. Baker, does it?

A Yes. But the Purdue work had occurred sufficiently long in the past from when this paper was written that it was not relevant for disclosure.

Q Well, sir, your Purdue work involved doing research in suggesting papers that you would write on behalf of Purdue, didn't it?

A No.

Q So the e-mail traffic that I got between you and Purdue about potential research and papers you might write, are you saying it's bogus?

A I don't remember that.

Q Well, let me show you Plaintiffs' Exhibit 4903.

This is an e-mail dated July 19th, 2016 --

MR. MAJORAS: Your Honor, can we wait until the witness has a copy before the questions start, please?

Q Do you have Plaintiffs' Exhibit 4903 in front of you?

A Yes.

Q You can see on the screen it's an e-mail from DanielKessler@Stanford.edu, I'm assuming that's you?

A Yes.

Q To Robert Josephson at Purdue Pharma, do you remember Mr. Josephson?

A No.

Q You e-mailed him and said, "A comprehensive study on reformulated OxyContin with abuse deterrent properties." Do you see the subject line?

A Yes.

Q "Bob, let's talk July 20th at 2 p.m.

"The studies you sent all share a common research design. Comparison of outcomes after verses before introduction of abuse deterrent OxyContin. My idea is to explore other sorts of research designs."

Do you see that?

A Yes.

Q And then you've got on point four more of a strategic question, "You mentioned to me, I think, that you have

talked with district attorneys' associations.

"Have you talked with the NCSL people?"

Who is the NCSL?

A My -- I think it's the National Council on State Legislatures.

Q And then you said, "I also suggested talking with pharmacy people like CVS and/or Walgreens. Have you talked with them?"

Do you see that?

A Yes.

Q So you were involved in looking at study design and possible publications with Purdue, true?

A I mean, I don't remember the specifics of what went on then. If you have other e-mails, I'm happy to look at them. What this e-mail is about is reviewing the existing literature for them so that they could consider what studies they wanted to do.

Q So you would say that you were consulting with them on the studies they might do and giving them advice in that arena, fair?

A I mean, that's my recollection, but I can't -- to tell you the truth, I cannot remember what I said in e-mails six years ago.

Q All right. So what's missing here is Purdue, and your explanation for that is "old news."

A It -- my recollection is that the disclosures for *The Journal of Health Economics* ask about work in the past year. This work had occurred in 2016, that was more than a year prior to the submission of this paper.

Q Actually in fairness, sir, your consultant agreement continued through almost the end of 2017 with Purdue, and this paper is one where the initial draft went in in 2019, you were within about, oh, I don't know, 18 months, so you just thought it was old news, is that right?

A But I don't have a precise recollection of all the dates, but if what you said is true and it's true that the journal's disclosure request was for work in the past year, then I complied with that.

Q And then as to your work with the pharmaceutical defendants in trial in this case, when this ultimately gets published in 2020, your testimony is you just hadn't started yet, because you don't list, for example, Walmart and those pharmacies that you talked about in the e-mail?

A Well, I -- I started working with Walmart in 2018, and the role that I was serving -- I was serving as an expert for them as they were in the position of a distributor defendant, and that's why I disclosed it.

Q Okay. So you just considered this distributor defendants to include the work you were doing for them as a pharmacy in this situation, fair?

A I considered distributor defendants -- I was working for Walmart at that time in its role as a distributor defendant, not in its role as a dispensing defendant.

Q All right. Now, the way we got into this is because I had asked you initially about your qualifications to be opining in this case. And I had your CV that had been provided to us, and I scoured your CV for opioids, and I can't find it on here except for two articles, one that you list as forthcoming and the one that we just looked at. That's all I can find you've ever done in academic publications on opioids. Am I correct?

A Yes. Those are my academic publications regarding opioids.

Q So you entered into the opioid arena as an academic years after you had entered as a hired consultant, fair?

A No. I mean, I -- the Purdue work was in 2016, then I started working on the topic in 2017, late 2017 or 2018, and then produced these papers.

Q Sir, I specifically asked you this question just now.

You entered into the opioid arena as an academic years after -- plural -- after you had entered in as a hired consultant.

You say that's not fair because you never published anything, but you started working on this article within a year of your retention by Purdue, right?

A No.

Q Here. This is not rocket science, so maybe I'm not asking it well.

What year did you start working with Purdue?

A I believe it was 2016.

Q What year was your first academic publication on opioids?

A Oh, it made it into the journal in 2020.

Q And it was accepted when?

A Probably 2019 sometime.

Q December of 2019?

A Okay.

Q Years after you had started working in the opioid consulting business, true?

A Oh, the acceptance of this paper, yes, but not the beginning of it.

Q The beginning of it would have been when?

A I don't remember.

Q Within a year of your -- but let's put it this way. By 2018?

A It was 2017 or 2018 sometime, yes.

Q All right. Well, now we're back into the land of why you didn't divulge your conflict. You're saying that you had the conflict within a year of when you were working on the paper, right?

A No.

Q Did you have the conflict with -- did you begin work on the paper in 2017 or 2018?

A I can't recall.

Q That was your testimony, you just swore under oath.

A Yes -- no, no --

Q Are you backing away from it, under oath?

A No. Certainly not.

Q All right. Your consulting agreement ran from November 11th, 2016, to November 10th of 2017?

A Well, it -- the consulting -- it couldn't have run from November 2016 because this e-mail was -- wasn't live in 2016 --

Q Okay. Sir --

A I'm just confused, I'm sorry.

Q I think you did work for them even before you entered into the contract with them, sir. I'm just trying to get these dates.

Let me give you Plaintiffs' Exhibit 4901, let's put it in the record. Let's be abundantly clear.

Miss Fitzpatrick will be handing you --

A Oh, okay.

Q -- Master Service Consultant Agreement between Purdue Pharma and Daniel Kessler. Do you see it, sir?

A Yes.

Q Do you see it's effective as of November 11th, 2016?

A Yes.

Q Do you see that the termination is going to be November 10th, 2017?

A Yes.

Q So there would be no doubt about it, you've got the Purdue agreement in place between 2016 and November 10th of 2017, true?

A Yes.

Q And now you're saying you began your work on the paper sometime in 2017 or 2018, true?

A Yes.

Q So you began your work on the paper within one year of your conflict and you never divulged it, true?

A No. I mean -- I don't think I was -- I think this contract existed -- I'm not sure -- I don't think I was paid under it.

Q What do you mean "I don't think I was paid under it"?

A I think the payments -- well, I just cannot recall the specific dates. I could go back and get it all straight. What I can assure you -- oh, yeah, there you go.

Q Sir, I showed you this yesterday. The payment right after you signed the contract, or the contract date, the payment is issued --

A Yes, in 2016 --

Q -- $40,000?

A In 2016.

Q Yes, sir. And then you continued to bill under the contract into 2017, we'll show you Plaintiffs' Exhibit 4904 where you're paid consultant fees of another $13,600 in 2017, May of 2017. Do you see that?

A Okay. Yes.

Q And that is within that one year time period; in fact that's the year you think you may have begun your paper, true?

A Yeah. I can't recall when I began the paper, but I know for sure that it was more than a year subsequent to the payments from Purdue because if it wasn't, I would have disclosed it.

Q You should have disclosed it, right?

A I can't -- I can't be sure of that because I can't recall just sitting here the exact date that I began work on the paper.

Q But you got into this because I said to you, you did your first academic work years -- plural -- after your work with Purdue, and you said, no, no, no, no, no. I did -- started this back in 2017, 2018. Remember that testimony?

A Yes.

Q All right. If you were telling the truth under oath when you said no, no, no, 2017 to 2018, you blew it on the

disclosure, didn't you, even by the way you read it?

A No.

MR. LANIER: Judge, I'm going to move on. I'm not going to beat a dead horse. I'm sorry I beat it so long.

BY MR. LANIER:

Q But as I move on, sir, you don't have a publication, an academic publication on opioids that precedes you being hired by the opioid manufacturer, Purdue; fair?

A Yes.

Q And if we look further at your CV, there's something else missing here. Nowhere on your CV do you list your work with Cornerstone, your professional witness work, do you?

A No. I don't list my witness work on my CV at all.

Q And you don't list your clients that you've consulted and been an advisor to on your CV either, do you?

A No.

Q Now, did you have a chance when you were looking through Dr. Alexander's report to look at his CV, which has been marked as Plaintiffs' Exhibit 4899?

A No.

Q But you had that in your reliance materials, you said you relied on it, true?

A Yeah, I mean, I paged through it. I just don't remember what he has on his CV, Professor Alexander.

Q Let's look at it for just a moment and compare some situations as we compare your testimony and opinions to his.

From 2010 to 2014 he showed himself with the FDA on the Drug Safety and Risk Management Advisory Committee, specifically May of 2014, Post-Marketing Requirements for Ownership Analgesics. Have you ever served on that committee?

A No.

Q Have you ever been called to testify or advise the FDA on anything related to opioids?

A No. I'm not a physician.

Q His Testimony and Briefings section goes back to 2012 on opioids. Do you see that, sir?

A Yes.

Q And in nonlitigation testimony and briefings he has worked not just as a doctor, but with the National Academy of Sciences, the Maryland House of Delegates, and others dealing with the opioid epidemic, regulation of opioids, prescription opioids, drug monitoring programs. Have you ever been called on to give such testimony and briefings by any of those entities?

A No.

Q If you look, you will see through his CV that while you were working for Purdue in 2016 and '17, he was chairing the Patient Centered Outcomes Research Institute looking at

clinical strategies for managing and reducing long-term opioid use for chronic pain.

Did you know he was doing that kind of work while you were working for Purdue?

A I wasn't -- I didn't -- I didn't recall this, but obviously he was, yes.

Q If you look at his academic publications, he is publishing in peer review literature about Rethinking Opioid Prescribing to Protect Patients' Safety and Public Health in the *Journal of the American Medical Association* way back in 2012, did you notice that entry or read that article?

A I haven't read this article of his, but I'm sure it's true.

Q Before you challenged his accuracy before his Honor, did you go look at any of his other publications that were done before you ever started working for Purdue, like Impact of Abuse Deterrent OxyContin on Prescription Opioids in 2015, or Prescription Drug Abuse, a National Survey of Physicians in 2015? Did you look at those?

A I never challenged Dr. Alexander's experience.

Q You challenged his conclusions and you suggested --

A Yes.

Q -- he made errors when he used West Virginia for Trumbull County, though he had thoroughly legitimate reasons for doing it, and you just assumed it was a mistake,

remember?

A Yes.

Q Before you formed those opinions, did you bother to read his 2015 peer-reviewed article on Prescription Opioid and Heroin Crisis, a Public Health Approach to an Epidemic of Addiction?

A No, but the fact that he's written several past papers doesn't mean that he couldn't have made a mistake on something today.

Q Several past papers, sir, is not just several past papers. He's written a boat load of papers on opioids that go way back in time, before he ever was hired, fair?

A I don't know when he was first hired, but if you say that's true, I'm sure it is.

Q And you say that doesn't mean he's error proof, true, but when you assess his errors -- and we'll walk through your assessment in a moment -- but as we do that, you understand there's quite a difference in his opioid experience and yours, right?

A Oh, yes. I mean, Dr. Alexander is a clinician. He has much broader experience than I do in that realm, and it's for that reason that I accept his abatement plan as given. I could certainly not offer an expert opinion about the clinical importance of different elements of abatement.

Q But he's not just a clinician, you know he is a

pharmacoepidemiologist with graduate training and degree in epidemiology, right?

A If you say so.

Q Well, I don't have to just say so. He said so under oath, but you can also look at his CV and see that from the Department of Health Studies he got a master's of science at the University of Chicago in 2003, do you see that?

A Yes.

Q And you can see that he teaches in the Department of Epidemiology at Johns Hopkins School of Public Health, do you see that as well?

A Yes.

Q So the epidemiologist and clinical physician, Dr. Alexander, you're challenging his epidemiology numbers and you're challenging his conclusions and opinions, aren't you?

A I'm challenging selected elements of his opinion that I think are incorrect. I am not challenging his clinical opinions or his epidemiologic opinions regarding the necessity or appropriateness of different forms of abatement.

Q Now, you also challenged the epidemiology figures of Dr. Katherine Keyes, didn't you?

A I am challenging some of the calculations of Professor Keyes, yes.

Q So as his Honor weighs this testimonial difference, if we start with the foundation of credibility and qualifications, which is I think where we always start, you saw Katherine Keyes' report and relied on it, correct?

MR. MAJORAS: Objection to the reading of experts that have already testified and improperly bolstering of his own expert through --

THE COURT: Overruled.

You can ask the question.

BY MR. LANIER:

Q Plaintiffs' Exhibit 23117 is in your reliance materials, it's her CV. You understand she has those epidemiology degrees; you do not, correct?

A Yes. Professor Keyes is an epidemiologist and I'm not, that's certainly true.

Q And she's not just an epidemiologist, she's someone who has received grants for studying epidemiology issues related to the opioid epidemic, true?

A Absolutely.

Q And you --

A May I finish?

Q It's a yes or no question. I thought you said "absolutely."

MR. LANIER: I'm sorry. I apologize, Judge.

THE COURT: Let him finish the answer, please.

MR. LANIER: My fault.

BY MR. LANIER:

Q Go ahead, sir. Is that true?

A I was going to say, yes, but that also doesn't mean that she's immune to making mistakes.

Q No question. We'll examine those carefully, but when we do, she has been authoring Economic Evaluation from Opioid Modeling: A Systematic Review in Peer-Reviewed Literature.

Did you read that article?

A Yes. I think I did read this article. Is this -- it doesn't list -- what's the journal that this one is in? It doesn't --

Q It is a publication unto itself.

A I think a later version of this appeared in a journal that I did read, yes, that the title and the -- list of authors look familiar to me.

Q Let me ask you about a few more. By the way, there are a boat load of opioid articles she has written from an epidemiological perspective that we're not discussing, fair?

A Yes. It appears she's written many articles.

Q In 2019 she wrote an article on Stigma as a Fundamental Hindrance to the U.S. Opioid Overdose Crisis Response.

Did you read that?

A This one does not look at familiar to me.

Q So when you were making opinions and assessments as to what percentage of beds might or slots might be filled or people might be getting treatment, you haven't read all of the peer-reviewed literature on whether or not stigma might be something keeping the numbers down, true?

A That's -- that's -- it's certainly true that I have not read all of the peer-reviewed literature regarding the influence of stigma on willingness to seek treatment, but the existence and extent of stigma does not alter my opinion about the incorrect calculation that plaintiffs' experts have done.

Q Well, I think it might alter your opinion on the incorrect calculation that you testified to in terms of percentages that would seek treatment. And we'll get to that later, but that's what I was targeting. You remember that testimony?

A I do. That was not Professor Keyes' opinion, that was Professor Alexander's opinion, but yes, I remember that.

Q That was Professor Alexander's opinion based upon numbers that were first promulgated by Dr. Keyes, do you understand?

A I don't think that's correct.

Q We can fuss about that later if we have time.

Her article on Increasing Prescription Opioid and

Heroin Overdose Mortality between 1999 and 2014, an Age Period Cohort Analysis.

Did you read that?

A Yes, I have read that one.

Q And you understand that while you criticize her method, you criticize her formula, you criticize her math, she's been peer-reviewed publishing on how to do epidemiology in opioids from long before you ever started work for Purdue, true?

A Yes. Professor Keyes has a long record of publications that -- but that doesn't mean she's immune to making mistakes.

Q I tried to find her earliest opioid article, and I'm not sure if I found it or not, but I've found this one, Article 273 dated back to 2010, Trends in Lifetime and Past Year Prescription Opioid Use Disorder Resulting from Nonmedical Use: Results from Two National Surveys.

Did you read that 2010 paper of hers?

A It rings a -- you know, I can't remember -- it rings a bell. I think that was a paper in which she used the NSDUH, but I would have to look back at it.

Q Now, one of the ways you are critical of Professor Keyes is the way she relied upon the Langley article, you're saying she wrongly relied on that by not segregating out one specific study, and instead using the entire meta-analysis.

Remember that?

A No, that's not my criticism.

Q Okay. We'll get to that slide then shortly, but for now, on what's missing, we finished that stop, and I want to go to restoration. Okay?

A Okay.

Q Now, to make sure that we're on the right set of restoration, why don't we start with a detour into the Larney decision, okay, or the Larney paper.

Are you tracking with me?

A Yes.

Q I'm going to call this the Larney detour.

First of all, in terms of peer-reviewed meta-analysis, how many meta-analysis have you conducted and published in peer-reviewed literature?

A Zero.

Q How many have you done and just not had accepted for publication?

A None.

Q Now the article that's being looked at here with Larney was peer-reviewed and published where?

A The Larney article was published in *JAMA Psychiatry*, but the point isn't -- I'm not criticizing the Larney article, I'm criticizing its use for this particular purpose. It's a fine article.

Q Well, you say you're not criticizing the article. The article is what was used by Professor Keyes, and she has been challenged on the fact that she would use an article that has mortality and has figures from outside the United States. Remember that challenge?

A Yes. The problem is the use of the Larney article for a purpose that it was never intended. That -- the problem isn't the article, the article's just fine. The problem is using an article about mortality of opioid misusers to calculate the size of a population of people with OUD, it's very simple.

Q Well, with due respect, you're giving your insight into Larney, but let's look at Professor Keyes' insight.

First of all, did Larney follow MOOSE?

A I'm sorry. I'm not familiar with MOOSE. What -- what's that?

Q MOOSE is Meta-Analysis of Observational Studies in Epidemiology. It's a standard academic factor in determining whether or not you're doing proper projections of disease in the population.

So now that I've told you what it is, do you know if Larney followed MOOSE?

A I don't, but again, I don't have any criticism of Professor Larney 's article.

Q Can we assume that when you came up with your own

figures for how many people had OUD, you did not follow MOOSE, you don't even know what it is?

A Right, but I wasn't using a meta-analysis to calculate the number of people with OUD, I wasn't writing a meta-analysis, so there would be no reason for me to follow MOOSE.

Q All right. Did Larney follow PRISMA? Do you know PRISMA is, I should ask first?

A That is another meta-analysis acronym, yes.

Q You're looking in the paper?

A Yes.

Q You'll see it says, preferred reporting items for systematic reviews and meta-analysis. Do you see that?

A Yes. I can see that now in the methods section of her article, Professor Larney's article. She does follow PRISMA, and I have no quarrel with her meta-analysis whatsoever. I'm sure it's very good.

Q But one of your quarrels, at least through the questioning and cross-examination of Dr. Keyes followed by your examination, is that this article uses studies outside the United States, right?

A Yes. That's not a generic criticism of the meta-analysis, it's only a concern when the product of the meta-analysis is being used to impute the size of a U.S. population.

Q And in that regard, if I were to tell you that the epidemiologist, Dr. Kerry Keyes, Katherine Keyes, she goes by Kerry, Dr. Keyes the epidemiologist swore under oath that in preparing one of her papers she took Larney and segregated out only the studies in the United States and looked at those from a meta-analysis perspective and found they were consistent with the overall conclusions of Larney. In other words, take out the subset of U.S. studies only, and you get the same basic results. Assume with me that was her testimony, okay?

My question to you is: Did you do that?

A I wasn't able to replicate exactly what she did. I -- I did look at those seven studies, but I was not able to replicate what she did because she didn't explain how she did it.

Q Excuse me, sir. When you say you weren't able to replicate, did you try to do a meta-analysis of those seven studies?

A No. What I was seeking to do was replicate what Professor Keyes did, and I wasn't able to do so.

Q Sir, Professor Keyes says she looked at them as a meta-analysis subset. You don't even know how to do a meta-analysis, you've never done it in your entire life, have you?

A I understand what she testified to. I was not

provided with any analysis that indicated that she did that, and so I couldn't evaluate it.

Q That wasn't my question, sir. Let me show you the question. See if you can answer it, please.

You don't even know how to do a meta-analysis, you've never done it in your entire life, have you?

A I have not done a meta-analysis, no.

Q So you could not replicate or fail to replicate by doing the meta-analysis because you don't know how to do a meta-analysis, do you?

A Well, when I -- when I read the Larney paper, I was able to follow how Professor Larney performed her meta-analysis because she explained it in the paper. It looked correct to me, but because Professor Keyes did not provide any documentation to support her opinion, I was not able to determine whether -- what its basis was.

Q Because you don't have the qualifications to do the meta-analysis yourself and determine whether you think she was right or wrong, she has to give you her math so you can see if she added two plus two equals four correctly, is that right?

A Well, it's standard practice when you do a meta-analysis, as Professor Larney did, to provide the calculations so that everyone -- researchers can see what you did.

Q That wasn't my question, sir. Can you answer my question?

A Can you please read it back?

Q Sure.

You don't have the qualifications to do the meta-analysis yourself and determine whether she was right or wrong, true?

A I -- I am not qualified to perform a meta-analysis, but I understand how to read a meta-analysis, and when Professor Larney presented the results of her meta-analysis, it made perfect sense.

If Professor Keyes had conducted a meta-analysis and provided me with the backup underlying it, then I could see what she did.

Q But you're in no position to challenge her testimony under oath that she looked at those numbers and determined that from a meta-analysis perspective they were consistent, you have no basis to challenge that under oath as being a lie or misrepresentation, do you?

A I don't know whether it's true or not, she did not explain what she did.

Q And then, sir, you get up here in front of his Honor and testified about the Larney chart, Walmart 1614, and when you did it, you took out -- segregated out one study, the Larochelle study. Out of all of the studies in there you

took out one and assumed it would be proper to do so, is that correct?

A No, that's incorrect.

Q Because you testified -- let's see if I can find your --

Slide number 3 that you had. "The most recent U.S. study in Larney reports a mortality rate of 2.10, more than four times the rate Keyes uses."

Do you see that?

A Yes.

Q So you call this under her first mistake, where you're saying her epidemiology work was a mistake because she used a flawed death rate, part of your reason to justify that mistake is you pulling out the Larochelle study, correct?

A My reference to the Larochelle study was meant to be illustrative that if you were to look at the most recent study that's from the same place that she's trying to use this death rate to infer the count of a population of, you would see that that study is vastly different from the average study in the meta-analysis -- I'm not suggesting that -- that you should use this one study. The point is, is that the study that's nearest in time and place to Ohio today is vastly different than the average that she's using.

Q You think Massachusetts is near to Ohio?

A It's nearer to Ohio than the average study in the

meta-analysis, yes.

Q Well, let's go to the Chang study in 2017, United States. Where was Chang based out of?

A I don't know. I don't remember.

Q Well, you're saying then --

A What I said was that the average study here is farther from Ohio than is Massachusetts.

Q I know you're not an epidemiologist, but when you're indicting one and saying she made a mistake by relying on this meta-analysis, did it ever occur to you to look up in epidemiology the term "outlier"?

A Actually I did consult the epidemiology literature about Professor Keyes' use of the Larney study to see what epidemiologists thought about this sort of thing.

Q Is this in your reliance materials?

A No, because I did so after the filing of her supplemental report.

Q Did you provide it to us in a supplemental report or any basis for your opinions?

A No. I have not filed a supplemental rebuttal report to Professor Larney's --

Q Did you supplement your reliance materials?

A No, I didn't.

Q Are --

A I'm referencing this in response to your question.

Q No, sir. You're adding on, it's not the question I asked. I asked a very direct leading question, with all due respect.

Let me ask you this. Are you familiar with the term sandbagging?

MR. MAJORAS: Objection. Argumentative.

MR. LANIER: I'll pull it down, Your Honor.

BY MR. LANIER:

Q Sir, have you produced this study to us with any indication that you would ever testify about it, or this literature?

A No, this is in reference to your question.

Q No, sir. My question is real simple here. My question is, before you criticized Dr. Keyes' reliance on Larney, did you consider whether or not the Larochelle is defined in epidemiology as an outlier?

MR. MAJORAS: Objection, Your Honor. The original question was, did it ever occur to you --

THE COURT: Well, he's withdrawn the question, Mr. Majoras, because you objected to it. I probably would have sustained it, but he withdrew it, so this is a new question.

BY MR. LANIER:

Q So, sir, do you understand what an outlier is in epidemiology-speak?

A I know what an outlier is in general terms. If it has a defined -- something defined specific in epidemiology, I'm happy to hear about it.

Q Let's do it this way.

You know what a CMR is, correct?

A Yes.

Q Tell the Court what a CMR is.

A Cumulative mortality rate.

Q Based upon 100 patient years, or no?

A It's the number of deaths per 100 patient years, yes.

Q To a 95 percent confidence interval, right?

A Those are the confidence intervals around it, yes.

Q And if you look, you will see that the CMR per 100 patient years for Larochelle is the 2.10 you referenced, correct?

A Yes.

Q There's not another study in all of the meta-analysis that begins with a 2, is there?

A No, that's -- I mean, that's the point.

Q And if you focus in on the United States of America, there's not another study that begins with a 1, is there?

A Yes, but the -- that's the --

Q There is?

A No. No. No. That's the point.

Q Sir, the point is before you indict Dr. Keyes' use and

analysis, did you look to see if every other study in the United States is a point -- is a zero point study?

A I don't -- I don't mean to say you should use the Larochelle study. The end point here is that this method of imputing the size of the OUD population based on highly variable studies from a meta-analysis from all over the world long ago is not as reliable of a method as simply using the gold standard NSDUH run by the U.S. government for the State of Ohio today.

Q All right. We'll look at that in just a moment.

But you're saying that the *Journal of the American Medical Association's* publication of this is not useful because it's too long ago and too far away?

A No. That's just not what I'm saying at all.

Q All right. Let me ask it --

THE COURT: Let him finish his answer.

A That's not what I'm saying at all. The Larney study is a fine study for the purpose for which it was intended, which is not to impute the number of people with OUD in Ohio today.

BY MR. LANIER:

Q All right. Then let's -- let's keep going.

Dr. Keyes' analysis that you call a mistake, you fix by relying on the NSDUH data, correct?

A Yes.

Q And you testified yesterday that there were hundreds of studies that rely on NSDUH, you dug into them on this case because you didn't really know about it before this case, right?

A Yes.

Q And those hundreds of studies, I didn't see them in your reliance materials. Did you put the hundreds of studies that rely on NSDUH in your reliance materials?

A No. I mean, there are several NSDUH studies in my reliance materials. My point in saying that there are hundreds of them that use the NSDUH, which you can see if you go to the SAMHSA website, that is the website of the Department of Health and Human Services, is to -- was to illustrate that it's a widely accepted and used data source for the purpose of determining drug use and misuse in the United States.

Q Well, with due respect, it's fit for a purpose, but that's not the only reference, sir.

You said yesterday, "I have not been able to find any quantitative estimates of the extent of undercounting in NSDUH or OUD."

Do you remember that testimony?

A Well, I believe I corrected that to say I've not been able to find any reliable quantitative estimates of the extent of undercounting of OUD in NSDUH. That would be my

opinion.

Q So if you didn't modify it yesterday, you'd like to modify it today and say "not any reliable quantitative estimates," is that what you'd like to say?

A Yeah. I'd like -- if that is what I said, I would like to include the word "reliable," and I'd like to say "of OUD in NSDUH," if that's -- that wasn't exactly what you put up there, and so I must have misspoke.

Q And in that regard, sir, we can look and go back and forth between your reliance materials that you read to get ready to testify and what the literature is that's out there, but before we go back and forth, can I ask you a common sense question?

A Please ask anything you'd like.

Q All right. Common sense here.

The federal government comes to your house and says, "I would like to take a survey. Trust me, I'm from a part of the federal government you've never heard of before, but I'd like you to tell me whether or not you're committing a crime and illegally using heroin; but don't worry, just answer it over here, and I won't tell the law enforcement people. They'll never find out."

Do you really think that everybody's going to immediately say, "Oh, yeah, yeah, I'm -- I'm doing that felony, I'm using heroin illegally"? Do you really think

people are going to readily say that?

A I think what you're saying is an important concern. To address that, the SAMHSA people assure respondents that they will not share their information with law enforcement and that they give them an anonymized way to respond to the survey.

Q It's an audio way, an audio computer way, so they're putting down a computer recording of, yes, I'm committing a felony?

A I don't think that's -- I think what -- the way that that system works is that it tells them the questions and then they respond on a keyboard, but your concern -- I understand what you're saying.

Q I'm just saying, common sense here, I mean --

A Well --

Q I'm going to enter it into the computer system so it will be there for all eternity, and I'm just going to trust them when they say there's no record of who actually admitted to the felony?

A The SAMHSA people have been working on this problem for 20 years. It is their opinion, and I defer to them on this, that they've developed the most effective way possible to address this concern, and I believe that they have.

Q Well, you say it's their opinion that they've developed the most effective way possible. You don't have a

cite for that, do you?

A Not off the top of my head, but I have -- I have looked at some SAMHSA studies that seek to validate the use of their processes, and those are reasonable validity studies.

Q Well, let's give his Honor the benefit of some peer-reviewed material on this, okay?

Plaintiffs' Demo Number 6.

The lawyer article.

Do you see this?

A Yes.

Q Now, when you issued your opinions --

MR. MAJORAS: Your Honor, can the witness be handed a copy --

MR. LANIER: Yes.

MR. MAJORAS: -- before he gets --

MR. LANIER: Your Honor, I'm not going to ask him questions on it until he gets a copy.

BY MR. LANIER:

Q When you did your opinions in this case you gave reliance materials that you considered "documents considered list," true?

A Yes.

Q And in the document considered list -- before you issued your opinions of the errors of Dr. Keyes and the

reason to use NSDUH, you had not considered the Reuter document, had you?

A This isn't about OUD.

Q I'm sorry, is that a yes or a no? What did you think I asked you?

A Could you please read back the question?

Q Yes, sir. And I'm trying to be real specific.

The document considered list, before you issued your opinions of the errors of Dr. Keyes and the reason to use NSDUH, you had not considered the Reuter document, did you?

A I'd have to look back at my documents considered lists.

Q I've got it on the screen right here, and it's in alphabetical order, and the Rs are Ruan, Ruhm, and then they jump to Schnell. You do not have the Reuter article as a document you considered before you used the NSDUH data, true?

A Yes. Yes, but this wasn't -- we were talking about OUD, not heroin use, with regard to my concerns of Dr. Keyes' analysis. This is about heroin use. It's not relevant.

Q Did you not know that heroin is an opiate?

A Yes. Heroin an a opiate.

Q Did you not know that a use disorder of heroin is an opiate use disorder, O-U-D?

A Yes, but --

Q All right.

A May I finish?

Q Well, I think I was going to ask you the question you want to answer, so you can either just volunteer the answer or I can ask it, however you want to do it.

A Maybe I'll finish.

I -- a use disorder of heroin is OUD, but heroin use itself is not the same as OUD.

Q Sir, NSDUH is in this Reuter article, the Reuter article is dated 2020, it's in a peer-reviewed publication of *Addiction*, and it says, findings, "Underreporting and selective nonresponse in NSDUH are likely to lead to substantial underestimation. Small sample size leads to imprecise estimates and erratic year-to-year fluctuations. The alternative estimate provides credible evidence that NSDUH underestimates the number of frequent heroin users by at least three-quarters, and perhaps much more."

"GPS" -- those are general population surveys -- "even those as strong as NSDUH, are doomed by their nature to estimate poorly a rare and stigmatized behavior concentrated in a hard-to-track population: Although many European nations avoid reliance upon these surveys, many others follow the U.S. model. Better estimation requires models that draw upon a variety of data sources, including global

population surveys, to provide credible estimates."

Do you see where I was reading that?

A Yes.

Q And so when you said you never found any that gave any reliable percentages, is it fair to say that at least as you initially issued your report, you had not considered Reuter?

A Yes. But this -- this isn't about OUD. It's -- my statement was I wasn't aware of a reliable quantification of the extent of undercount of OUD in NSDUH. This is about -- this is about heroin use, which is a different question.

Q So you believe that frequent heroin use is not an Opiate Use Disorder?

A Opiate Use Disorder is a specific disorder and it includes people who may be frequent heroin users, but also includes other people. So to determine the correct amount of undercount you would have to have an analysis that looked to OUD.

Q There is a set that is Opiate Use Disorder. Do you believe that that set includes frequent heroin users, people who are using heroin frequently?

A Yes. I believe that frequent heroin users are highly likely to have OUD.

Q And so when the Reuters article talks about frequent heroin users being undercounted by at least three quarters and perhaps much more, you can't swear to his Honor, yeah,

but that's irrelevant because it's not Opiate Use Disorder; you put it in the set.

A I didn't say it was irrelevant. What I said was I was not aware of a reliable estimate of the extent of undercounting of people with OUD in the NSDUH, and that's still my opinion.

Q But where you listed in Slide 11 Keyes' mistake, or I guess this is a combination of Keyes and Alexander, you have as an overstatement, plaintiffs almost double the number of heroin users in NSDUH, do you see that?

A Yes.

Q You call that an overstatement under oath to his Honor, when you never considered before your report the fact that frequent heroin users are underestimated by NSDUH, by at least three quarters and perhaps much more, you never considered that before you swore under oath that the plaintiffs overstated by almost doubling the number of heroin users, did you?

A Well, what I said or what I said in my report, and I believe what I testified to, was that I understand the concern about counts of the number of heroin users, but what surprised me was Professor Alexander's use of this expansion factor when in his own peer-reviewed research published in 2020 he accepted and relied on the NSDUH estimate as a count to calibrate his model for opiate mitigation strategies.

That's what I said.

Q No, sir. The slide that's on the ELMO right now is your slide you read from when Mr. Majoras was talking to you, it was Slide Number 11, you specifically swore to his Honor that you had prepared these slides or helped prepare these slides, and you swore under oath in overstatement number 4 --

A Yes.

Q -- that the plaintiffs overstate by almost doubling the number of heroin users in NSDUH. Do you not remember that testimony?

A Yes.

Q In that regard, sir, your report and what you had to say about this is not only here, but did you consider --

MR. LANIER: Miss Fitzpatrick, if you would please hand out Demo 8, the Keyes article.

Q I'm going to have handed to you this article, Number 8, "Drug and Alcohol Dependence Reports," a peer-reviewed publication by Dr. Keyes and others. Do you have this in front of you?

A Yes.

Q If you would look on the second page under "methods," in this peer-reviewed publication --

A Yes.

Q -- Dr. Keyes says, "NSDUH is an annually-conducted

in-person survey of U.S. civilian" -- doesn't include people in the military, right?

A Yes.

Q Doesn't include people living in the United States that aren't U.S. citizens, right?

A I'm not sure, but --

Q And I'm not 100 percent positive on that either, I want his Honor to know. I think that's the case, but I'm not 100 percent.

"Noninstitutionalized populations" -- you see that?

A Yes.

Q "Age 12 and over" -- "older," right?

A Yes.

Q Then it says, "Individuals aged 12 to 17 are oversampled."

Did you know that?

A Yes.

Q It says that "NSDUH data underestimates the prevalence of many health conditions, including drug use."

Did you understand that?

A Yes.

Q "To estimate the amount of underestimation in NSDUH, we relied on a state-level capture-recapture estimate of OUD to establish a multiplier."

Do you see that?

A Yes. This is a -- referencing a Barocas article, I'm aware of this.

Q You're aware of this now, true?

A Yes. I mean --

Q And the reason I say "now" is because this Barocas article in 2018 is not something you considered in preparing your report, true?

A It is not something I considered in preparing the report because it was only -- Professor Keyes' rebuttal report and this paper were only given to me at the end of April after I submitted my report.

Q Well, I understand that, sir. But the Barocas paper that's being referenced here was 2018. Surely you did a literature search before you determined that NSDUH is a proper figure, didn't you?

A Yes.

Q And in that, the Barocas study was an estimate to approximate a multiplier correction. Barocas, et al., used the Massachusetts All-Payer Claims data linked across six sources to multiply capture individuals with OUD.

Now I know this is epidemiology, but you said you aren't an epidemiologist but you know how to read it, right?

A Yes. And I've since -- since being provided with Professor Keyes' rebuttal report and her article, I have read the Barocas article, and it is flawed, and the flaws in

it are highlighted in the paper that I mentioned earlier but that you declined to allow me to share.

Q "In the overlapping year 2015, the capture-recapture OUD prevalence estimate was 4.6 percent."

A Yes.

Q "This is 4.49 times higher than the NSDUH estimate."

Do you see that, sir?

A Yes. This paper is flawed and not reliable.

Q This paper --

A The Barocas -- the Barocas paper, yes, is flawed and not reliable.

Q So this is just really goofy of Dr. Keyes and all of these other epidemiologists to publish this paper to explain that, and somehow get it past peer reviewers and into a peer-reviewed publication? Is that what we're to understand, smoke and mirrors?

A I wouldn't say smoke and mirrors. I would say even peer review is not a perfect process.

Q So what is this article that you never warned us you were going to talk about that you want to spring on us? Would you read it to us?

A It's an article by --

MR. LANIER: May I approach, Your Honor?

BY MR. LANIER:

Q This article that we will attach as -- let's see -- if

the Katherine Keyes article is Demo 8 --

MR. LANIER: Your Honor, with your Court's permission, I'm going to call this one that this witness has just handed me Demo 8A because I know that number has not been taken, and then we've got a reference for it for the trial.

Q So Demo 8A is the article that you say debunks Katherine Keyes' and Barocas's article, correct?

A Well, I -- I didn't use the word debunks, I would just say expresses the concern that it may not be reliable.

Q And this is -- let's see -- where -- what -- where do they cite Barocas in this article?

MR. MAJORAS: Your Honor, I believe since there's only one copy in existence between the witness and Mr. Lanier, if I could hand the witness a copy of the same article, it would be helpful.

THE COURT: Well, I think we should identify this article by authors, by date, so I have some clue what this is about.

MR. LANIER: All right. The article, Your Honor, that I've called Plaintiffs' Exhibit 8A, is by Jones, Harris, et al. It is in *Addiction*, it is entitled "Estimating the Prevalence of Problem Drug Use from Drug-Related Mortality data," and this article was submitted August 21st of 2019. The initial review was completed

November 5th and the final version accepted May 4th, 2020.

BY MR. LANIER:

Q Now, sir, I just flipped to the references at the end of the article because I'm looking for where they referenced the Barocas article, and I'm not seeing it. Can you tell me which footnote or where the reference is so we can go find what they have to say about Barocas?

A Sure. It's reference 43.

Q Thank you.

And reference 43 inside the article itself is found on what page?

A The second page of the document.

Q Here it is.

A There you go.

Q Thank you.

"Other authors have also demonstrated a tendency for capture-recapture model, including higher order interactions to produce higher and often extremely variable prevalence estimates."

A Yes.

Q So you're saying that this reference tells you that Barocas is not reliable because it has a higher and often extremely variable prevalence estimate?

A Well, I mean, I did some further research into the Barocas article. I mean, the fundamental problem here is

that when you use capture-recapture models across many data sets you have to assume that the presence of a person in the different data sets is independent, that the data sets are doing independent draws from the underlying population, and in the Barocas article that's clearly not the case.

And so the problem with Barocas is that it violates the assumption of independence of the many sources for the capture-recapture, and the fixes that you try to employ to correct for that lack of independence generate this flaw that they highlight in the Haley article. It's a statistical problem.

Q This is -- you are -- you are indicting a method of epidemiology research, aren't you?

A No. Absolutely not.

Q So you don't think capture-recapture is an epidemiological model?

A Oh, it is, and capture-recapture is a perfectly reliable method just like mortality multiplier methods are when they're used correctly.

Q Let's go on.

Exhibit Number 7, Plaintiffs' Demo Number 7 is going to be handed to you. It's a RAND Corporation report. You know what the RAND Corporation is and what kind of work they do?

A Yes.

Q This is the Gregory Midgette study, M-I-D-G-E-T-T-E, 2006 to 2016, "What America's Users Spend on Illegal Drugs."

Do you see this?

A Yes.

Q Published 2019 by the RAND Corporation, do you see that as well?

A Yes.

Q Again, not anything that you had on the documents you considered in drafting your opinion that Dr. Keyes has got the epidemiology wrong, true?

A Yes. This is not on my documents considered list.

Q And if you look at page 30 where they're making their adjustments, the RAND Corporation, "We estimate the size of this population that is missed by arrestee surveys using NSDUH," but they add this sentence: "Because NSDUH misses many cocaine, heroin, and methamphetamine users, we follow previous ONDCP adjustments for occasional drug users in NSDUH, and multiply this population by four."

Do you see that?

A I'm sorry. What page are you on? I'm --

Q Bates page number 30, the actual report is page 10.

A Let me just catch up to you.

Q I apologize, sir. I didn't know you weren't with me.

A Okay. So what's -- what are they referencing --

Q "NSDUH misses many cocaine, heroin, and meth users."

We follow previous ONDCP adjustments for occasional drug users in NSDUH, and multiply this population by four."

Do you see that?

A Yes.

Q Something else you never considered when you indicted Keyes for the overexaggeration of almost doubling the use, right?

A No. No. That's not my testimony.

This -- I believe this RAND report is, again -- actually it's got an overlap with the paper that you gave me. Jonathan Caulkins, yes, this is about the use of illegal drugs, it is not about the number of people with OUD.

Q Sir, the overstatement that you put on Slide 11 that you wrote up that you testified about was that the plaintiffs almost double the number of -- what does that say?

A Yes.

Q No, it doesn't say "yes." What does that say?

A Oh, it says heroin users.

Q Doesn't say OUD, does it?

A Oh, yes. And my -- I understand the concern that you expressed about the count of the number of heroin users, and I do understand that there are these methods to, quote/unquote, correct for that.

What surprised me, which is what I was highlighting here, was that Professor Alexander in his peer-reviewed research did not adopt this RAND correction and did not adopt the correction that Reuter, Caulkins, and Midgette suggests in *Addiction*. Instead Professor Alexander used the number from NSDUH, so I was just doing what he did in his earlier published peer review research.

Q What question do you think I asked?

MR. MAJORAS: Objection, Your Honor.

THE COURT: Overruled.

A Could you repeat it for me?

BY MR. LANIER:

Q Yeah. My question was, it doesn't say OUD, does it?

A Yes.

Q Yes, it does say OUD?

A No. Yes, it doesn't say OUD.

Q It doesn't say OUD, it says heroin users, true?

A Yes.

Q And so adjustments for occasional drug users in NSDUH, multiply this population by four.

It's talking about users, the same word you used, correct?

A Yes. I understand that this correction would apply to the number of heroin users, yes.

Q And so when you testified under oath that Keyes had

made a mistake, an overstatement by almost doubling the number of heroin users in NSDUH, you never took into account the published literature that says drug users in NSDUH could be multiplied by four, did you?

A Well -- so -- overstatement number 4 was not made by Professor Keyes, as you said in your question. This was Professor Alexander. And my concern was that if he had believed that these corrections which have their own assumptions folded into them were relevant, then I would have expected him to have used them in his own published peer-reviewed research.

Q Sir, with due respect, we'll get to his research in a minute, because I'm not sure you've read it.

Did you read APOLLO 1 and 2?

A I'm not sure what you're referring to.

Q We'll get to that in a moment. But plaintiffs, whether Keyes or Alexander, the plaintiffs almost doubling the number of users in NSDUH is actually, according to the RAND report, very conserve, isn't it?

A I would have to look back and see what NSDUH measure they're applying this to. There is an issue with that.

Q Well, if you continue to look in the RAND report on page 16 of the RAND report, which is Bates number 36, we get more detail.

"The inadequacy of NSDUH to describe heroin use is

more apparent. Our estimate of 2.3 million chronic heroin users in 2016 is nearly five times larger than the NSDUH estimate for past month use, a more inclusive definition of heroin users."

Do you see that?

A Yes.

Q "Our exploration of available data made clear NSDUH is not a useful measure of the level of heroin use in the United States."

Do you see that?

A Yes.

Q Again -- by the way, the next expert testifying, Dr. Chandra, I believe is a consultant to the RAND Institute. Did you know that?

A No.

Q But your comment that plaintiffs almost double the number of heroin users, it's not really out of line, in fact it's conservative with the material, isn't it?

A Well, could I ask to bring back the document that we were looking at?

Q Sure. And I think you've got a copy of it up there as well.

A Yeah.

Q So my question -- make sure you're answering my question and not giving a speech, please.

My question was, your comment that plaintiffs almost double the number of heroin users is not really out of line. In fact, it's conservative with the material, isn't it?

A What I was going to say was that 5X figure that you're citing to support your hypothesis that it's conservative is against past month use, and the numbers that I was using are past year use, which is more expansive than past month use. So it's not quite an apples-to-apples comparison.

Q Now, you in this regard of the shortcomings of the way the plaintiffs have put this together -- let's get to the restoration stop at the road here.

I'm going to ask you a couple of questions to make sure I got this right. You're relying only on NSDUH for your figures, aren't you?

A Yes.

Q Do you include in your figures the OUD people that are in jail, in prison?

A No, that is a limitation of NSDUH. It does not sample institutionalized populations.

Q Do you include the OUD people who live on the streets?

A No. That is a limitation of NSDUH also, that homeless with no fixed address.

Q In fact, you testified yesterday -- daily copy 221, line 24 -- 1 percent of the population is without a fixed address, right?

A Well, I'm not sure if that's what I said. If it is, then I misspoke. What -- what I had meant to say in that context was that in Ohio around one percent of the population lies outside the NSDUH sampling frame, so that would be incarcerated people and people homeless with no fixed address. That's -- it's the entire missed sampling frame that's around one percent.

Q So if we take 500,000 people for these counties, one percent without a fixed address is how many?

A Well --

MR. MAJORAS: Objection, Your Honor.

THE COURT: Overruled.

You can answer.

A If there's around 500,000 people in the counties, then one percent of them is going to be 5,000 people. That would be without a fixed address and incarcerated or institutionalized.

BY MR. LANIER:

Q Right. Where the fixed address is U.S. Prison or something like that, county jail?

A Yes.

Q All right. So the percentage that may be people on the streets out of that 5,000 proportionally for the county, you don't know which percentage may have drug problems or what the drug problems may be because you just don't count

them?

A The NSDUH does not count them, and so --

Q And you don't?

A Yes. But given that I use the NSDUH, those people are not counted, but the point I made yesterday was that even if the OUD rate of that population is very much higher than the population -- the broader population OUD rate, that won't move the needle on the total number of OUD people very much.

Q Well, all right.

Do you include OUD people in hospitals?

A No. Institutionalized people are not -- are not in NSDUH.

Q Now, I want to pause here for a moment, and we're going to do this later when we test, but have you really thought through what you swore to the judge yesterday? I mean, have you looked at what you said?

A I stand by everything I said.

Q Because this was your Slide Number 9.

A Yes.

Q "Keyes' mistakes result in an unreliable and overstated OUD population because NSDUH should show 2,048 people in Trumbull County that are OUD, Opioid Use Disorder people," correct?

A Yes. That's what you get from applying the 1.210 percent for Ohio --

Q Yeah.

A -- to the over 12 population in Trumbull.

Q So this is yours. This is what you're adopting. This is Kessler numbers, as opposed to Keyes' numbers, correct?

A Yes.

Q So yesterday with one of the witnesses, we got Plaintiffs' Exhibit 4900, this is a profile of the 12,949 Trumbull County Mental Health and Recovery Board clients served in fiscal year 2020 through October 7th, 2020. The fiscal year begins -- Frank --

MR. GALLUCCI: June 30th -- or July --

BY MR. LANIER:

Q July 1, I'll represent to you, based upon the representation to me. All right? Are you seeing this?

A Can I -- can I -- I don't have the whole document. Can I see it?

Q Yes. Miss Fitzpatrick is looking for a copy of it. Counsel should have a copy from yesterday, and there might be one up there, it was used yesterday.

A Could I have the whole -- also not just this page, but the entire document, please.

Q Sure.

And what we'll do until we get you that -- oh, Mr. Delinsky to the rescue.

Now, sir, on the projection system, looking at primary

diagnostic groups for adults, the clients for Opioid Use Disorders for Trumbull County during that July-August-September, three-and-a-half month stretch, is 1695. Do you see that?

A Yes. I'm just struggling to know what the time period is.

Q It shows you right up above, these are clients served in fiscal year 2020 through October 7th, 2020, do you see that?

A I see -- you're saying that SFY2020 -- I'm supposed to assume that that means starting July 1, 2020, because that doesn't -- the document doesn't say that.

Q Yes, let's assume it's starting fiscal year 2020 and assume the fiscal year begins July 1, but heavens, if you want, you can start January 1, 2020 for my illustration because it won't make a lick of difference, okay?

A Okay.

Q All right. So let's look.

During that timeframe in Trumbull County, the clients -- and this is just the adults -- primary diagnostic groups for adults -- Opioid Use Disorder, 1695 getting treatment, correct?

A Well, I don't know if those are unique people or if it's just clients counted, you know, who have multiple visits.

Q Okay. So when it says that this is a profile of the clients, a profile of the 9,666 adults, in that profile 1695 clients are listed for Opioid Use Disorder. Do you see that, sir?

A Yes.

Q Now, you say based upon your numbers for Trumbull County, there's only 2,048 OUD clients or people in the entire county, that's your number, correct?

A Right. That's -- that's unique people.

Q Right. Unique --

A I don't know what --

Q Well, I'm --

A I don't know what this is.

Q We'll get to that in a moment because that's going to come up on slots for beds because -- and how long people get treated, because you've testified about that as well.

But regardless, assuming that this document is what it says, if there is 1695 people getting treated during that time period, that would mean -- let's do the math here -- by your numbers, 1695 people out of a total denominator of 2,048 got treatment in that 2020 timeframe.

You with me?

That would mean what percent get treatment?

A You mean I can -- should I use the calculator here to --

Q Sure, if you want to.

THE COURT: I can estimate it.

It's about 85 percent. Is that right, Doctor?

THE WITNESS: I mean, the key question is when they say clients do they mean unique people or not, because if they don't, then it wouldn't be appropriate to divide 1695 by 2,048.

BY MR. LANIER:

Q Well, the point is, sir, if your number's correct on the OUD people, that is a world record for percentage of people getting treatment, isn't it?

A But that's -- that's only if this is the number of unique people -- if it's clients in the sense of visits could be many from the same people, then this would not be surprising at all.

Q Time out. Look at the math, though.

85 percent getting treatment would be -- that's just impossible, isn't it?

A That would be surprising, but for that to be true, it would need to be true that this is measuring unique people, and I don't know the answer to that.

Q Either way you're going to have a problem, we're going to deal with that problem later --

A No.

Q -- on bed spaces, because you assume nobody comes back

a second time when you argue bed spaces, but that's for a later debate. The debate right now in focus is this.

85 percent is not believable for a percentage. You said 40 percent's too high to expect treatment, remember?

A Yes. The key question here is whether this 1695 is unique people or not, and until we know the answer to that, it is not possible to determine whether this quotient that you've calculated is relevant.

Q But if it's 1695 over 7560, what would the percentage be?

A Would you like me to calculate it?

Q Well, here. 169500 divided by 7560. Get rid of two 0s. 756 will go into that. Something with a 2, right? You're somewhere around 21, 22 percent?

A Well, here, I'll -- maybe I should just calculate it.

Q Sure. That would be great.

A 22.4 percent is what 1695 divided by 7560 is.

Q 22.4, I was pretty close.

22.4 percent is in line, isn't it?

A Yeah, but I -- again, without knowing what this 1695 is, I -- I really -- I'm not able to determine if that calculation that you just made is relevant.

Q Well, go back to the chart, Plaintiffs' Exhibit 4900, and let's look a little more carefully.

Opioid Use Disorder, they show 1695 clients, not

claims or visits, right?

A Yeah. I -- I just don't know.

Q Well, yes, you do, because look at the next column. It's got how many claims. How many times did they make a claim, a visit, and those 1695 made them 169,000 times, an average of 99 claims per client. Do you see that?

A I would just have to go back and look and see what is the basis for this chart.

Q And the claims, if you look on the next page, are claims that are made under Medicaid and non-Medicaid for the various reasons that are being sought, do you see that?

Sorry.

Do you see that, sir?

So look, for example, at -- buprenorphine, a treatment for Opioid Use Disorder.

A Yes.

Q The claims that are being made involve drug units that are over a half a million.

A I see that.

Q So when you say that plaintiffs overstate the five-year abatement costs that Keyes' mistakes result in an unreliable and overstated OUD population, if your testimony about the percent that seek medical treatment is correct, Dr. Keyes has the right estimate for Trumbull County, you don't, true?

A That -- I mean, I would have to just look back and see what this chart is based on before I could give you an answer to that.

Q Because your testimony on treatment percentage yesterday was "My opinion is 38.4 percent of treatment is an ambitious target but an appropriate one for use," do you remember that?

A Yes.

Q So the idea that 85 percent get treatment, that's beyond measure, right?

All right. Next related subject to this. I want to talk about Kessler -- about Alexander's APOLLO model.

I think we can fill in a couple of these blanks really quick and easy because we covered it. A number of heroin users -- you didn't do any epi work yourself, right?

A No. I have -- I have never written a paper about the number of heroin users.

Q Right. You don't have any expertise as an epidemiologist, you're not qualified and competent as an epidemiologist, you don't have any degrees in epidemiology, true?

A I am not an epidemiologist.

Q Don't have any degrees in it?

A No, I do not have any degrees in epidemiology.

Q Now, did you read Dr. Alexander's APOLLO 2020 and 2022

papers?

A So let me just make sure I know which papers you're referring to.

Q Okay. Why don't we hand you a copy of each.

A Oh, that would be wonderful.

Q And I think the 2020 was marked by Walmart as Exhibit 1605 and the 2022 is marked by Plaintiffs as Demonstrative 9.

Now, my question is, did you read both APOLLO 2020 and APOLLO 2022?

A I have read both of the papers that you just put in front of me.

Q Great. Now, did you use any kind of a multiplier to NSDUH when you used your NSDUH figure?

A For the number of heroin users?

Q For the number of heroin users, for the number of Opioid Use Disorder, for any of it?

A No, I did not use a multiplier to increase the number from NSDUH.

Q And you have said that you use the same approach with NSDUH that Dr. Alexander used. Do you really want to say that or do you want to modify that testimony?

A What I said was that in his 2020 paper he calibrated the model there off of the NSDUH count of heroin users. That's what I hope I testified to, that is my opinion.

Q Well, calibrated the model, that's epidemiology word -- phrase, that's something very specific in epidemiology, right?

A I mean, I -- I don't know. I mean, I'm just saying that's what he did.

Q Right. He used a Markov model, right?

A Yes. This is a Markov model.

Q And you're familiar with the Russian mathematician Markov who did --

A Not personally but --

Q Of course not, he died over a hundred years ago, but you're familiar with who he is, right?

A Yes.

Q I say he died over a hundred years ago. He wrote over a hundred years ago. I don't know when he died.

And you're familiar with the different kinds of Markov models, correct?

A Yes.

Q And so the calibration under the Markov model doesn't mean that he used only NSDUH, does it?

A For the count of the number of heroin users, that is what he did.

Q Well, he inflated those rates of NSDUH in his study and allowed the model to run hot by using the lower bound of the confidence interval, 1.9, did you look in that much

detail to see?

A So are we referring to his 2020 --

Q APOLLO 1, 2020.

A 2020 paper?

Q Yeah.

A Can you show me what you're saying --

Q Yeah, I can.

A -- in the paper.

Q Would you first answer my question, though? Are you aware of the fact that he did that?

A I don't know. I -- I can't recall it. If you can show me where it is in the paper, I could --

Q We'll start in the paper with page 5 of 14 in the paper, where in the very paper he said "We included sensitivity analysis, focused on heroin uses, since evidence suggests NSDUH may significantly underestimate the population of heroin users."

Do you see that?

A Yes.

Q And so within the framework of this, do you know -- and by the way, do you know which study he's citing here, number 21?

A No.

Q That's your RAND report, the Midgette study.

A Oh, yes. Yes.

Q And this is -- this is published in the *Journal of the American Medical Association's* network open, right?

A Yes.

Q So did you go into any detail to look at how he used the Markov model and NSDUH?

A Yes, I looked at the supplementary online content that the article refers to.

Q And in that supplemental online content you saw the big charts at the end where he goes through each element in those charts and explains how he modified the numbers?

A Yes. I see these charts.

Q So my question to you is, did you read this carefully enough to see whether or not he just took the straight NSDUH numbers or whether he allowed the model to run hot and used that as one of the calibration sources?

A I just -- you said that before, and I just don't recall -- I mean, if you can just show me where it says that, I'd be able to better answer your question. I just don't remember this saying that.

Q It begins with "Methods with initial populations. The initial population for the 32 compartments was estimated using 1 of 4 national databases, the U.S. Census, Centers For Disease Control and Prevention, Wide-Ranging Online Data for Epidemiologic Research, National Survey on Drug Use and Health, NSDUH, and the National Epidemiologic Survey on

Alcohol and Related Conditions."

Do you see that?

A Yes.

Q "For estimates of the active OUD population, we relied on NSDUH data that defines OUD as" -- and it gives the DSM definition -- "within a 12-month window."

Do you see that?

A Yes.

Q "We also used National Epidemiologic Survey on Alcohol and Related Conditions data to estimate lifetime OUD prevalence, assuming an increased risk of relapsing to active OUD."

Do you see that as well?

A Yes.

Q And then this model consists of 109 monthly transitions between the 32 compartments.

And there's a model of how the APOLLO formula works down at the bottom of that page 3.

Do you see that as well?

A Yes.

Q And this is the model that's also explained in greater detail in the charts of the supplement, true?

A Yes.

Q Now, as a beginning starting point, was the purpose of this paper to determine how many people in the United States

have OUD?

A No.

Q So you're using the paper for a purpose different than the paper was written, true?

A No.

Q Are you using the paper to model how many people in Ohio, these two counties, have OUD?

A No.

Q That's -- okay.

I think I've beaten this horse as far as I am going to get with you. In the interest of time, I'm going to move on.

THE COURT: Okay. If we're going to a new subject, I think it's a good time to take our mid-morning break. We'll take 15 minutes and then pick up with the balance of Dr. Kessler's testimony.

(Recess taken at 10:30 a.m.)

(Court resumed at 10:48 a.m.)

THE COURT: We'll continue with cross-examination.

MR. LANIER: Thank you, and I'll try to get this done by lunch.

BY MR. LANIER:

Q Sir, we have covered the areas that I needed to talk to you about on restoring the opinions of Keyes and

Alexander on the numbers of OUDs that they used. I'd like to focus now on restoration on the number that are getting treatment.

Now, you claim that the plaintiffs' experts, quote, failed to acknowledge some don't feel the need for treatment, close quote.

Do you remember saying that?

A No.

Q Okay. It is in your report on page 12, sub point B, in bold print of your report. "Professors Alexander and Rosen fail to acknowledge that some people with OUD do not feel the need for treatment for it"?

A Oh, yes. I'm sorry.

Q So now you remember saying it.

A I'm with you.

Q Good.

Well, you're wrong there. I don't know any other way to put it. You're just wrong, aren't you?

A I don't know.

Q Well, let me see if I can change your opinion in this case.

You have in your notebook given to you by Mr. Majoras yesterday the spreadsheet of Dr. Alexander for Lake County and Trumbull County, the Lake County one is Plaintiffs' 23, 105A, and it talks about abatement categories. Remember

this?

A Yes. I'm sorry, I'm just trying to get all my documents --

Q Don't worry about it. This ain't going to be hard, you can get this off the monitor. This is like a gimme almost.

You see the abatement categories?

A Yes. Yes.

Q Look at category one. Prevention. Reducing opioid oversupply and improving safe opioid use. Do you see that?

A Yes.

Q Part of that includes patient and public education, do you see that?

A Yes.

Q And part of that's critical because, as testified to by Dr. Alexander, it will help reduce the stigma and get more people into treatment. Do you see that?

A Yes.

Q And they even have a need for connecting individuals to care, they have an entire section on that. Do you see that as well?

A Yes. Yes.

Q So they do recognize that some fail to acknowledge, some don't feel the need for treatment because they're putting money to educate people to the use of treatment. Do

you see that?

A Yes.

Q So you're wrong when you say they fail to acknowledge some don't feel the need for treatment, they do acknowledge that, and they tried to do something about it, fair?

A Yes.

Q Next subject of restoration, length of treatment.

Do you see that?

A Yes.

Q Now, you mistook slots for single patients, true?

A No.

Q You thought that these slots that were there in the 40 percent were patients, didn't you?

A Can I ask that you be more specific? Is this with regard to Professor Alexander's abatement plan, his -- I forget what you all are calling it -- redress model.

Q Yeah.

You had opinions, overstatement number 3, Slide Number 11?

A Yes.

Q "Plaintiffs assume individuals with OUD will receive treatment 365 days per year." And then Mr. Majoras asked you to all of a sudden hear this new idea of slots, and then you thought for a second and said slots don't make sense.

Remember that?

A I mean, I -- I remember the general discussion. I just didn't know what slots meant.

Q Yeah. So the idea that the plaintiffs aren't estimating that people will be in treatment for 365 days out of the year but rather that they may go into treatment, they may come out, they may go back into treatment, the same patients, you understand that?

A Yes.

Q And so it's a question of what percentage of the OUD population at any set point in time might be in treatment, and the hope is 40 percent, you understand that?

A Yes. But that's not what's in Professor Alexander's redress plan.

Q Well, that's what he swore was in it, you just disagree?

A Well, it's just not what it says.

Q Okay. The judge can wage the testimony of -- weigh the testimony of you and him.

But you thought that he was saying a single patient's going to be in the bed for 365 days, didn't you?

A That's just what it says on the plan.

Q All right. So that's what you think is what it says.

A I mean, it's -- it's based off Professor Keyes' 5668 number, and that's individuals, not slots, whatever slots may be.

Q But, sir, your refuge that you were trying to find your safe harbor on your percentage problem we dealt with before the break of 82 percent or 22 point whatever percent -- remember that, your refuge position was what if they left but then came back and then it's the same person, multiple visits, remember?

A Yes. But that's a totally different data source. I mean, that's --

Q That's not my point, sir. My point is you are saying that some people will go away and will come back, and so the question becomes one of slots, any particular month, what percentage of the OUD population should be in treatment and have a slot available, you don't understand that's the issue?

A That's -- that's just not -- excuse me -- how Professor Alexander either described it or costed it out, that's just not how he did it.

Q Well, let's be clear for a moment. I'm going back to my what's missing stop with you, and I'm going to talk about treatment.

Are you an M.D.?

A No.

Q Have you treated anyone with OUD in your entire life?

A No.

Q Have you ever worked with people who have OUD to get

them treatment?

A No.

Q You understand the answer to all of those questions is "yes" for Dr. Alexander?

A Yes. He's a clinician and a physician, yes.

Q But you have never treated or referred for treatment anyone with OUD, true?

A Yes. I've never -- that's true, yes.

Q And you understand that the plaintiffs have suggested an abatement model to the judge that will come with an annual review, and so if the beds are not filled and the money is not expended, then that money can be credited back, given back, rolled into the next year? You understand there's a review put in place here to figure out whether or not it's being used, did you know about that?

A No. I don't know anything about that.

Q It's a good policy, though, isn't it?

A It sounds sensible to me, I just don't know anything about it.

Q By the same token, you were suggesting that this in treatment -- inpatient treatment be done or even outpatient treatment at a for-profit hospital as opposed to a standalone facility that the county runs on a not-for-profit basis and perhaps could run more cheaply, right?

A No.

Q Okay. By the way, you used the TEDS data to show OUD treatment length in Ohio being less, and I'm not fussing that it is less, we've never said that it's 365 days -- I mean, for some it might be, but we don't think that's true.

Were you using TEDS A or TEDS D?

A This is TEDS -- it's the discharge one, so I think it's called TEDS D.

Q Yeah. So you weren't using TEDS A to see how many people are admitted and may leave or anything like that, you were just using the discharge, right?

A Yes. But you -- you need to use the TEDS D to get treatment lengths because the TEDS A -- I mean, you'd want the discharge data for treatment lengths.

Q Right. TEDS A will tell you how many beds you need for people coming in, TEDS D will tell you how long they stayed, fair?

A No. I don't -- yeah, that's just not how I would think about it.

Q So you take issue with Dr. Alexander using TEDS A to talk about how many people would need a bed and access to a bed, right?

A No. I just -- I mean, I just -- if you could point me to what he did and where, I could be better able to comment on it. I just don't know.

Q Well, sir, you read his report. I'm not here to

educate you, but it's right here, it's in the report in these spreadsheets. Did you -- did you get ready for today?

A Oh, yeah. I've spent a lot of time with these spreadsheets.

Q By the way, you spent a lot of time with these spreadsheets, you missed the only math error, didn't you?

A I don't know what --

Q There was a math error in here where he multiplied something by 5,000 instead of 5,600 and he had to correct it on the record because he was -- didn't want to say that this was all accurate until he fixed that math error. You never caught that math error, did you?

A I just don't know what -- I wasn't here for his testimony, I don't know what you're talking about.

Q Right. So you never caught any math errors where he multiplied anything wrong?

A I just don't know what -- if you'd point me to what you're talking about, I could look at it.

Q That's all right.

Now, the one you're calling a math error is the fact that he uses Trumbull data from Ohio on the children's issue and the pregnant mothers. Do you remember that?

A Yeah, I remember this -- this question, yes.

Q Yeah, and you had a slide on it where you said it was a mistake on his part. You called it a math error in your

report, you didn't use that language on your slide, though, right?

A Yes. Yes.

Q And you didn't use it on your slide because it's not a math error even though you called it that in your report, right?

A No. I mean, the error is -- is what it is.

Q Well --

A I'm sorry.

Q You called it overstatement number 5?

A Yes.

Q "Plaintiffs rely on West Virginia data to calculate the total number of pregnant women with OUD in Trumbull County but not Lake County."

Do you see that?

A Yes.

Q And do you know the reason why he went to West Virginia data?

A He didn't say.

Q So you don't know the reason why?

A No.

Q From an epidemiologic perspective, have you looked to see how the numbers in Trumbull County compare with the rest of Ohio?

A We could -- which number are you talking about?

Q The total number of pregnant women.

A Yes.

Q Trumbull County is an outlier within Ohio because of their rates, isn't that true?

A It could -- it could be. I don't know.

Q Well, if it is an outlier, then it would be appropriate to use something that is more aligned with the percentage, wouldn't you agree?

A I just don't understand -- I mean, the difficulty here was that he uses West Virginia data on the prevalence of OUD for a thousand hospital deliveries for Trumbull, but uses Ohio data for Lake. I just -- because Trumbull's only an hour's drive. I don't understand.

Q Well, do you know how far Trumbull is from Pennsylvania or West Virginia?

A I offhand -- I don't know how far it is from West Virginia. It's going to be more than an hour.

Q Do you know -- the bottom line is you don't know how to treat an outlier in an epidemiologic study because you've never done an epidemiologic study, true?

A I mean, if there were an explanation for why he just used West Virginia data instead of Ohio data, I mean, I'd be very happy to entertain it and -- it might be valid, I just couldn't find one, so -- it seemed like given you had two counties separated by an hour's drive, why would you just do

that?

Q And if those counties have statistically significant differences on that issue that would provide an explanation, you just don't know, fair?

A Well, there may well be an explanation, and if Professor Alexander had one and I could look at it, I'd be happy to consider it.

Q Okay. Let's go to the third stop on the road.

This is the testing stop, all right?

Now, you've got your method, and you and I had some fussing about that method, you recall?

A I recall some of your questions.

Q Yeah. My questions hinged off of your three-step model, and whether or not your three-step model has any valid use or has ever found any scientific support or ever been even used outside of this case where you have launched it. You remember those questions I had?

A I do.

Q Okay. Now, in that regard, you give another Slide 16, which is where you explain your three-step model, correct?

A Yes.

Q And my challenge to you was whether or not this is legitimate science or if not junk science, at least experimental science that's never been used before. Remember those questions?

A I do remember.

Q And you sent me to those three articles in that footnote, and we're going to pull those out in a minute, but let's first establish what your three-step model is, okay?

A Yes.

Q Step 1, you want to estimate regression models to determine a portion of opioid-related mortality associated with prescription opioid shipments.

You remember that?

A Yes.

Q Now, is this a multiple linear regression model, an MLR?

A Yeah. I haven't heard that term, it's a -- it's a linear regression, yeah, that's right.

Q You never heard the term --

A Of -- I guess "multiple" meaning multiple right-hand-side variables, sure.

Q Yeah. I'm going to show you an exhibit in a little bit about limitations about multiple linear regression in formulation of policy recommendations, but you've never even heard of the term multiple linear regression?

A No. I know what you mean.

Q Okay. And that's what you tried to do here in Step 1, right?

A Yes.

Q And then Step 2 is you would calculate the opioid-related mortality allocable to flagged dispensing, correct?

A Yes.

Q And then Step 3, you would calculate the abatement costs allocable to the challenged conduct, true?

A Yes.

Q And that is your three-step method, right?

A Yes.

Q Now, I'm assuming if we look through your citations, you are going to argue to his Honor that this three-step method has been used before?

A Yes. It was used by one of plaintiffs' experts in this case, something very analogous to it.

Q Well, with all due respect, I don't think that anything like that's been offered in this case, and I don't know that anything like that has been done, if you're referring to Dr. Cutler.

A Yes.

Q But Dr. Cutler didn't even testify in this case.

A Oh, I mean, if I'm not allowed to -- I reviewed those as my documents considered. If I'm not allowed to reference them, I mean, I'd obviously respect that.

Q No, it's not that you're not allowed to reference them, but the first point, did you even understand that he

never even testified in this case?

A I thought he testified by deposition.

Q Not in the -- not in the courtroom. We did not play his deposition. He was not a witness in this case. You didn't know that?

A That's -- I didn't, but --

Q And are you still going to -- just that issue aside, are you swearing to his Honor that Dr. Cutler calculated abatement costs allocable to defendants' challenged conduct?

A Well, he did something extremely similar to --

Q That wasn't my question. I don't want no "similar."

Did Dr. Cutler -- are you swearing under oath that you believe Dr. Cutler calculated abatement costs allocable to the defendants' challenged conduct, yes or no?

A I'm just going to look at his reports to make sure I answer accurately.

He did not use the word "abatement costs," so I'd have to answer no.

Q He didn't use "redress costs"?

A He did not use the phrase "redress costs."

Q He didn't use "costs."

A That -- that's not quite right.

Q You think he calculated the damage or abatement or calculable costs allocable to the conduct?

A I mean, I don't -- I mean, he said what he said in his

report. I --

Q Why don't you read the sentence to his Honor that you have been representing under oath represents him doing Step 3.

A So David's --

Sorry, I just want to make sure I'm --

Q Yes, this is under oath. Please make sure you're correct.

A Yeah, I mean, I don't want to waste everybody's time.

Q Oh, it's not a waste. If you're going to swear that you're doing this because he did it, I'd like to see where he did it.

A I mean, if -- if you'd like to see what I'm basing my statement on, I'd be happy to share his reports with you.

Q Oh, I've got his reports, sir. I've met with him on multiple occasions. My question to you is: Where does he do Step 3 of your three-step model, calculate abatement costs allocable to defendant's challenged conduct? Show me anywhere he does that.

A So it's -- it is -- it is accurate to say that what Professor Cutler did was really Steps 1 and 2, and then I'm adding Step 3 to that.

Q All right.

A The lines that Professor Alexander did to allocate non-mortality harms based on mortality. That's really the

best way to say this.

Q So your whole model of allocating costs -- and that's what your model is, it's one to allocate costs, correct?

A Yes.

Q And that allocation is calculated in Step 3, correct?

A Yes.

Q And I ask you whether or not this has ever had any scientific support, do you remember that question?

A Yes. Yes.

Q And Step 3, calculating the abatement costs allocable to defendants' challenged conduct through an MLR has never been done in science, including by Dr. Cutler, true?

A Yes. I mean, what -- what Professor Cutler did was to suggest that non-mortality harms could be allocated using methods like Step 1 and 2. He did not -- he did not allocate costs in dollar terms, though. That's quite right. But other non-mortality harms, he did suggest that this method could be used to perform.

Q Wait. To perform the calculation of costs attributable?

A No. To allocate other harms --

Q Nobody's --

A -- to challenged conduct using steps -- using methods like Steps 1 and 2.

Q I don't think anybody's fussing some of that stuff.

My question to you is, where do you get the idea of calculating abatement costs allocable to defendants' challenged conduct? That's your invention, isn't it?

A Well, that -- that is my addition to this based on Professor Alexander's more general opinion that non-mortality damage can be allocated using mortality. The step that I'm adding is to do that for dollars. But if you could do it for the different harms, then converting those to dollars is just -- it's an accounting -- it's an accounting --

Q With due respect, I know you're a law professor, have you ever taught the subject of abatement in public nuisance?

A I do not think I've taught that -- that topic.

Q So this idea that just because you can allocate -- you can use analysis to show that if I use death analysis, I can transfer that death analysis over to injury analysis and I can prove that the two are related. You think that means that you can then do abatement costs based upon a percentage of challenged conduct?

A Yes. I mean, if -- if it is reliable to allocate any number of harms with this -- with Steps 1 and 2 as does Professor Cutler, then the step that I'm adding, which is to say that can be converted to dollars, I think is scientifically valid.

Q I am going to ask you to look, please, at Plaintiffs'

Demonstrative 16, and I have lost this screen.

I have handed to you Plaintiffs' Demonstrative 16. It is "Misleading Indicators. The Limits of Multiple Linear Regression in Formulation of Policy Recommendations."

Are you familiar with this article?

A No.

Q Are you familiar with the idea that there are limitations on multiple linear regression in formulating policy recommendations, like who should pay what costs?

A Oh, yes. Yes, for sure.

Q This paper says the thrust of the present paper is that -- and it's a detailed explanation that we can look at -- but the bottom line is would you agree with me that some applications, some applications of MLR techniques are misleading? Would you agree with that principle?

A Oh, yes.

Q Would you agree with the principle that to the professional statisticians, most of the issues related to when it's proper or not will be already familiar from the technical literature, but there's much less familiarity within the policy analysis community? Would you agree with that concept?

A You know, I just haven't read this paper. But if you could tell me what -- what your concern is, I could try to be more helpful.

Q I will. This paper gives a standard multiple linear regression equation, uses the Alan Miller, you're familiar with that equation, aren't you?

A Yes.

Q Is that the same equation you used?

A I mean, in very generic terms, but it's not exactly identical to this, but yes, it's an equation that specifies an outcome. In my case it was mortality as a function of some X variables, some parameters, regression coefficients, and then an error term.

Q And then what I want to try and do without this denigrating into a math exercise, what I'd like to try and do is see if you will agree with certain general concepts that his Honor can take into consideration, okay?

Would you agree with me that there are dependent variables and independent variables that you take into account when you do a regression analysis?

A Well, there's one dependent variable in a regression. That's the Y variable. And then there are several Xs in a multiple regression, yes.

Q All right. You've got to make some judgment calls when you do regression analysis, don't you?

A Oh, yes.

Q And so you make those judgment calls when you try and establish this calculation allocable to defendants'

challenged conduct, don't you?

A Certainly in the design of any regression model there's a judgment, and I outline in my report that the judgments that I made, the key features that I wanted my regression model to have.

Q You'll see on table two, page 412, and the reason I'm suggesting this is because I think you're asking his Honor to adopt a brand new approach to this that's never been used, and my question is if he's going to have this, I think the record might be good to reflect certain questions that a user of policy-oriented regression analysis should ask.

Do you see that?

A Yes. Yes.

Q What is the intended policy use?

A Yes.

Q Is yours simply to describe data?

A No.

Q You're not making any predictions, are you?

A Yes. I mean, what -- the purpose of the regression is to make a counterfactual prediction of what mortality would have been in the absence of the challenged conduct.

Q Mortality in absence of challenged conduct?

A Yes. That's what people use regressions for.

Q Yep. All right.

Now, that's your intended policy use, fair?

A Yes.

Q Now, did you set forth in your testimony for his Honor your assumptions and caveats explicitly with the supporting data?

A But -- they're in my report, I'd be happy to discuss them.

Q My question to you is, your report is not in evidence, did you set forward to his Honor your assumptions and caveats in your testimony explicitly and supported?

A Well, I mean, I wasn't asked about my assumptions and how I designed the regression model, but if you would like to ask me or Mr. Majoras would like to ask, I'd be happy to say, but I'm not allowed to say that.

Q So the answer to my question is no?

A Well, it --

Q It's pretty simple.

In your testimony, did you set forward your assumptions and caveats explicitly and supported, yes or no?

A I haven't been given the opportunity to do so.

Q So that's a "no" answer, right?

THE COURT: Well, to be fair, he wasn't asked, so it's really an unfair question, so --

BY MR. LANIER:

Q Okay. I don't mean to be unfair.

Mr. Majoras never elicited that testimony from you

when he was making this record for his Honor, did he?

A I mean, I can't -- I can't recall.

Q To what extent --

I'll tell you what then. I'm going to set that aside and we're going to move to the testing questions that I have for you on it.

I'm talking about your proposed method, you understand?

A I think.

Q In other words, your three-step -- what do you call it -- my three-step model, that's what I'm talking about. You got it?

A Yes.

Q And this is an unpublished methodology, these three steps, true?

A I mean, no one would write a paper about this kind of thing because it's so specific to a litigation context, but what it is is using methods that are widely used in economics, so the underlying regression method is certainly a published methodology, and then using regressions to calculate counterfactuals is also a published methodology. The application specifically to the allocation of costs for opioids in Lake and Trumbull County hasn't been published.

Q It doesn't have to be opioid-related conduct in these counties. The whole idea -- you don't think so a Law Review

article on this would be informative to considering the restatement, a new way to allocate costs?

A Well, this is a standard approach to cost allocation.

Q In litigation? Where has this ever been done in litigation?

A To allocate costs based on a counterfactual from a regression is what damages experts do.

Q Okay. Let's look at some of your assumptions.

Did you use MME or dosage units?

A I used MME, and the purpose behind that --

Q I'm not asking that, sir. I just need to know which one you used.

A Okay.

Q Did you use MME or dosage units?

A MME.

Q And the dosage units are quite different than MMEs, aren't they?

A They are. I mean, MME up-weights molecules that are more powerful and so potentially more likely to cause harm, and that's why I used it.

Q Well, wait a minute, though.

So the judge understands, you made that judgment call in your regression analysis because you think that the MME up-weights molecules that are more powerful and so more likely to cause harm?

A That's always --

Q Is that --

A That's also what Professor Cutler did.

Q No, sir. With due respect, Professor Cutler wasn't making an assessment of what was likely to cause harm, and I would like to stick with what you have done. Okay?

Sir, did you understand the difference between which is more likely to addict people, high MME or low MME drugs?

A My understanding is that the risks of harm and addiction in the use of opioids increase as the number of morphine milligram equivalent units increases. That's my understanding.

Q What's that based on?

A That's based on my review of all of the literature that we've been discussing.

Q Can you give us one article that says that?

A Sitting here right now, I cannot provide a citation for that understanding.

Q Did you know that some opiates are written for terminal cancer patients?

A Yes.

Q Did you know that those typically have very high MMEs to help handle the terminal cancer pain?

A I certainly -- I didn't know, but I believe that if you say it's true.

Q Yeah, that's one of the main uses of fentanyl, prescription fentanyl, is for cancer treatment, terminal cancer treatment. Did you know that?

A I believe -- that sounds familiar.

Q And did you compare the MMEs on fentanyl -- prescription fentanyl to the MMEs on Oxycodone?

A I know that fentanyl per, you know, unit weight has a much higher MME than Oxycodone does.

Q And did you know that Oxycodone is the one that's more likely to be used in communities and abused in a way that is addictive?

A Yes, but I mean, the point is that Oxycodone has -- has a higher MME per unit weight than other opioids, and so the up-weighting works to incorporate that problem.

Q Did you do a regression analysis using volume of pills instead of MMEs?

A I can't recall if we -- if I looked at that, but I would expect it to come out similarly.

Q Now, you -- oh, really? Do you not recall the percentages difference with these defendants if you look at their pills distributed, dosage units, as opposed to MMEs?

A Oh, I -- I for sure don't know that just sitting here today.

Q All right. Judgment call you made in your regression analysis, fair?

A Yes. That was one -- one decision I made in my -- designing my regression, yes.

Q Now, in your regression analysis, you say that you isolate defendants' challenged conduct from conduct plaintiffs do not challenge.

Is that true?

A Yes.

Q So one of the areas that the plaintiffs challenge is that by putting too many pills into a county, it provided an increased marketplace for illegal drugs, whether they be illegal OxyContin or whether they be other illegal opiates like heroin, fentanyl, and things of that nature. Do you understand that?

A Yes.

Q In other words, by putting too many pills into the county, it enriched the crime market for the criminal underworld to come in and to be selling additional illegal opiates because they had a captive purchasing base, do you understand?

A I understand that's plaintiffs' theory, yes.

Q And did your regression analysis take account the conduct of the defendants and how it may have affected the underworld crime of illegal trafficking in narcotics?

A Yes.

Q And that's taken into account in your regression

analysis?

A Insofar as it led to illicit opioid mortality, absolutely.

Q Not just mortality, what about all of the people who are addicted but not dying from it?

A Well, my regression analysis only examined the outcome of mortality, so outcomes other than mortality are not examined by my regression analysis.

Q So if somebody got hooked after using the drugs for 30 days, the drugs from these defendants, and they got hooked after 30 days and they're still alive and they're still hooked, they have OUD, your regression analysis did not use those figures?

A No. The regressions were only seeking to estimate the effect -- the association, rather, between shipments and mortality, so I did not examine other dependent variables of any sort.

Q So when you are isolating defendants' challenged conduct, you mean challenged conduct that leads to death but not challenged conduct that leads to other elements of crime, addiction, et cetera, that are non-death, right?

A Yes. But I mean, what -- the assumption that I'm making in using the mortality analysis is that it serves as a reasonable proxy for the whole universe of potential harms, and that's an assumption that Professor Alexander

made and also Professor Cutler explicitly made.

Q Not -- we'll fight that fight with -- at some point probably in briefing, because that's not the way --

If that's your basis, if your basis is I only did it because the plaintiffs' experts did it and I'm mimicking then, then say that's your testimony, but if you independently believe you've done it right, please say so.

A I believe that it is valid to use mortality as a proxy for other harms. That is my independent opinion, but that opinion is consistent with the opinions of plaintiffs' experts.

Q But no plaintiff expert has ever said you can use mortality to calculate abatement costs, nobody's made that leap, have they?

A I don't think -- I'm not aware of the use to allocate costs, but as I said, as I testified, people have certainly used it to allocate to defendants' challenged conduct other than -- may I finish?

Q That's not my question.

THE COURT: Well, let him finish the answer, please.

A But people have certainly used this approach to allocate not -- to defendants' challenged conduct, non-mortality harms, although not costs, abatement costs in particular.

BY MR. LANIER:

Q In other words, no, not abatement costs, the plaintiffs -- no experts ever said you can isolate defendants' challenged conduct and use it to calculate abatement costs that would be allocable to that conduct. Nobody has said that you can do that, have they?

A Not that specifically, but all of the component parts, yes.

Q Okay. So where does your model, your regression model, take into account plaintiffs' complaints that lax business practices all around the country, including in Florida, caused an inflow of drugs that are not shown in the MMEs filled by the defendants in the county?

A It is -- it is true that the data on shipments that I used which are the ARCOS data do not account for these potential inflows from other areas due to illicit trafficking. The use of ARCOS data in estimating opioid-related mortality is standard, and plaintiffs' experts in other reports have all used ARCOS data for this purpose.

Q For this purpose, sir? The purpose that I'm asking you about is only calculating abatement costs allocable to their challenged conduct.

A For the -- for the purpose of estimating the association between mortality and shipments, which is the

way I used the ARCOS data in this method.

Q Yeah, that's not my point.

Please, sir, my point is, your Step 3 that you were going to calculate the costs allocable to the challenged conduct, the challenged conduct includes an inflow from other places, and you do not allocate based upon that challenged conduct, do you?

A It is a limitation of the data I had available, the ARCOS data, that it does not account for illicit flows from other states, and that is a limitation that all of these analyses -- published analyses that use ARCOS and plaintiffs' prior reports suffer from.

Q Sir, you gave an explanation of your answer, but you never answered the question. Please answer the question and then we'll look at your explanation.

You do not allocate based upon that challenged conduct, do you?

A Well, I mean, I -- I do allocate based on the challenged conduct of the defendants.

Q An inflow from other places -- look at my question. Here, can you read that on the screen?

"The challenged conduct includes an inflow from other places outside the counties" --

A Oh, I'm sorry.

Q -- "and you do not allocate based upon that challenged

conduct, do you?"

A Does the -- does the defendants' challenged conduct include inflow from other places?

Q Yes. We challenged the conduct of the defendants to the jury and said their conduct includes bringing pills in from other places where they allow prescriptions to be filled too loosely. That was part of the conduct. You got me?

A The --

MR. HYNES: Objection, Your Honor.

THE COURT: What's the objection?

MR. HYNES: Mr. Lanier's -- the premise of his question. The plaintiffs did not introduce any evidence of defendants' shipments from outside the two counties.

THE COURT: Well, I think they did, but I'm not sure they did it in the way that Mr. Lanier phrased it, but --

MR. LANIER: I'll rephrase it.

BY MR. LANIER:

Q Our allegation of wrongdoing included the idea that prescriptions were being filled in Florida and were being hauled up here --

THE COURT: They did have that.

BY MR. LANIER:

Q -- up here into Ohio, and that there were also

prescriptions filled in stores that were just outside the county line but may have been brought into the county. And your analysis, sir, does not account for any of that kind of challenged conduct, does it?

A This is challenged conduct to Walmart, CVS, and Walgreens in counties other than Lake and Trumbull. Is that what you're asking?

Q Yeah. I'll put it into an example.

For example, let's say that the companies had real loose policies in Florida and that people were going down to Florida to get prescriptions filled because they could get them filled real easily, and then they were hauling them up here and selling them up here on the black market. Your analysis calculating the abatement cost allocable to their challenged conduct does not extend to that type of challenged conduct because all you did is look at how many they sold in the county, right?

MR. MAJORAS: Objection. Misstates the evidence from the earlier trial.

THE COURT: Overruled.

A In calculating the counterfactual mortality rates, I used the number of flagged prescriptions flagged by Dr. McCann in Lake and Trumbull Counties. I did not use the number of flagged prescriptions in other states, yes.

BY MR. LANIER:

Q Thank you.

And then your explanation for that answer we'll go back to now, you said it's a limitation of the data I had available, the ARCOS data, that it does not account for illicit flows from other states?

A Yes.

Q And that's a limitation all these published analyses that use ARCOS in Plaintiffs' prior reports suffer from, right?

A Yes.

Q In other words, this is just -- that's not something you can sit there and divide up with the data that you've had available to you at least, right?

A Yes. It is -- it is a challenge to account for -- for these -- this sort of thing. But in my opinion, that challenge is not sufficiently great to invalidate the general approach of using ARCOS data to apportion mortality, which is a standard method that's used in published work and in other reports in this case.

Q Well, sir, I just want the Court to have available to it when you calculate abatement costs allocable to the challenged conduct, you mean certain challenged conduct, you didn't have the data to do it to all challenged conduct, right?

A Yes. The way that I defined challenged conduct in my

calculations was the count of flagged -- Dr. McCann's flagged prescriptions in Lake and Trumbull Counties.

Q Okay. And so, for example, another allegation that was made was one of the business competition variety, that as one certain store, let's just say a Walmart store, if they decide to run their business in a way that allows them to sell something cheaper because they don't have enough manpower at the store to do the work right, or enough computer system technology to do the job right, if they can do the job cheaper, they will have an effect on those businesses trying to compete. You understand that concept as an economist, right?

A I understand the general concept.

Q Okay. And so if some business leaders like Walmart, Walgreens, CVS, if they conduct business in such a way that to compete other people cut similar corners, you have not addressed that challenged conduct when you decided how you were going to allocate abatement costs, true?

MR. MAJORAS: Objection, Your Honor, wholly outside the evidence presented in the first round.

MR. HYNES: Objection.

THE COURT: Overruled.

A I'm not aware of any evidence that that occurred.

BY MR. LANIER:

Q So the answer would be "True, Mr. Lanier, I did not

account for any challenged conduct such as that," right?

A I wasn't even aware that --

Q Great. Thank you.

A -- competition was at challenge here. I thought that I had interpreted the record as Dr. McCann's flagging of potentially inappropriate prescriptions was the measure of challenged conduct.

Q And then you assumed that the same percentage of challenged filling of prescriptions was done by all of the other nonparties in the case?

A No.

Q So just on -- by these defendants?

A Yes. I calculated the number of prescriptions that Dr. McCann flagged just done by these defendants.

Q So would it have changed your methodology at all -- and I'm almost done here, but I want to ask one more testing question, area -- would it have changed your methodology at all under a couple of scenarios.

Here we've got scenario one. Scenario one, here's a fella -- and this fella gets a prescription that he shouldn't have had filled, and he's able to get this prescription for 30 days and he gets addicted. You follow me?

A Yes. I understand.

Q All right. So we're going to put "addiction."

And then this fella, prescription for 30 days, addiction, can't get any more. And so he goes to the illegal market and starts buying his opiates on the street, be they illegal pills brought in from Florida or be they heroin smuggled in through Mexico. Do you follow me?

A Yes.

Q And he continues to use those.

A Yes.

Q So all he got was 30 days of a prescription, hydrocodone, relatively low MME, right?

A Yes.

Q And let's say he got his prescription filled wrongly at Mr. Majoras's client, Walmart. You with me?

A Yes.

Q And for the next two years he's stealing, selling anything he's got, prostituting himself, whatever it may be, to try to keep his habit alive and fed. You with me?

A Yes.

Q So all of the harms that come from this, the crime, the societal effects, I won't detail them all, but all of the things that flow from this, under your model, what percentage of the costs associated with trying to get him clean, trying to clean up the streets, trying to deal with the criminal element that's come in, trying to stop the flow of illegal drugs, out of all of the costs that are there,

how much would your model allocate to Walmart, who filled that 30-day prescription?

A I mean, I -- I can't give you an answer to that, but it -- certainly if -- if that prescription was flagged by Dr. McCann as potentially inappropriate, then it would get put into the tally of prescriptions that defendants should not have dispensed. And to the extent it affected mortality, either prescription opioid mortality or illicit opioid mortality, it would then show up as an allocable event, which would then get charged to Walmart.

Q So you're saying that as long as this fella dies Walmart's going to pay a percentage or the whole thing, they would pay 100 percent of that?

A Well, as long as the prescribing behavior that causes these non-mortality harms also caused mortality harms proportionately, then that's what this approach picks up.

Q So you don't discount any of this for any other defendant or for any nondefendants, you'll put the full freight of this on Walmart in the hypothetical I've given you?

A If the prescription that was flagged by Dr. McCann came from Walmart, yeah, it goes to Walmart.

Q If the prescription flagged by Dr. McCann -- well, what if this is one that he didn't flag, because he only had a certain number that he could look at? We were only given

a certain number of prescriptions, we didn't have all of the prescriptions.

MR. HYNES: Objection, Your Honor. He ran his analysis on all of our prescriptions.

THE COURT: Sustained.

BY MR. LANIER:

Q I'm not sure I'm understanding this.

So you say that if Walmart has done it, then it's a hundred percent Walmart, right?

A Yeah, if --

Q All right. Then let's take a second individual, and this second individual is just like the first, with one exception. He got his prescription of 30 days at Walmart and then a second one of 30 days at Walgreens. Will your model assess what amount to which company?

A In your hypothetical, were both of those flagged by Dr. McCann?

Q Sure.

A Well, then they would be -- responsibility for harm mortality that resulted from that would be split between them.

Q 50/50?

A If the two flagged prescriptions had the same MMEs, yes.

Q All right. Next hypothetical, this time we've got the

same -- another fella, and this next fella, same situation except 30 at Walmart and 30 at Independent X, whatever that independent store is, independent pharmacy.

How much does Walmart pay?

A I didn't have flagged prescriptions for independent pharmacies, so I wouldn't be able to allocate any mortality to them. So in this case if that person later, you know, died or if people died as a result of this pattern, it would all be allocated to Walmart because we don't have the flagged prescriptions for the independent pharmacies. We're not a -- not a complete set like Dr. McCann did it.

Q So your regression analysis does not sort through other -- I mean, other pharmacies beyond these three, fair?

A No. That's not correct.

Q Does your regression analysis take into account and reduce the amount these pharmacies are going to be allocated by other actors?

A Well -- so the regression is estimated off of the whole markets shipments, the counterfactual calculation of the amount to be allocated is only done for the three defendants.

Q Your regression analysis, if there are -- we'll just use 1,000 so we don't get into a fuss about the numbers -- you've got 1,000 people who are OUDs; your regression analysis parcels out responsibility, fair?

A Well, no. I mean, the regression analysis is based on mortality, so strictly speaking, what the regression is doing is apportioning variance in mortality across counties based on the total shipments.

Q All right. Let's change it to 100 deaths.

A Okay.

Q If those 100 deaths in an abatement plan need to be abated to the tune of $100 million -- it's going to take a hundred million to stop the deaths into the future, all right? You with me?

A Okay.

Q -- how do you allocate -- what percentage do you allocate to Walmart?

A Well, I mean -- the allocation process works off the number of flagged prescriptions, so I'm struggling with -- I don't understand your question. I'm sorry.

Q Okay. I just want to know how much Walmart pays the price on these 100 deaths. You've done an analysis, what percentage is Walmart's?

A Well, what I have done is to calculate the fraction of mortality in Lake and Trumbull Counties allocable to Walmart and the other defendants based on their flagged prescriptions.

Q So if we've got a hundred in those counties or in one of the counties, whatever you want, what fraction do you

allocate to Walmart?

A Let me --

THE COURT: Is that the percentage at the bottom of page 17?

MR. LANIER: That's what I got up here, Your Honor. Page 17, to try to help move it along.

THE WITNESS: Yes, exactly. Thank you.

THE COURT: I've been paying attention.

BY MR. LANIER:

Q So the percentage would be .176 percent, right?

A Yes.

Q CVS, .445 percent.

Walgreens, .693 percent?

A Yes.

Q Add those together, sir, and what do you get?

A 1.314 percent.

Q So your contention, looking at these scenarios that I pooled together, if we have a hundred deaths, you think 1.34 percent is attributable or allocable to defendants 1 through 3. My question to you, sir, is where do you get the other 98.66 percent allocated?

A I didn't seek to allocate the remainder.

Q But you put together a regression analysis formula that's got to take into account ultimately 100 percent and let's start deducting out of it, right?

A Yes.

Q And so you don't know who the rest of the people are that you're blaming?

A I didn't seek to allocate the remainder of the variance in mortality across counties. I only sought to allocate the variance in mortality attributable to defendants' challenged conduct.

Q But you told me that if there's a person who has a 30-day prescription that got them addicted, move them to illegal drugs with all that entails, that Walmart would pay 100 percent, is that true?

A Well, not for that particular person, but for people who were dispensed prescriptions that were flagged by Dr. McCann as challenged at Walmart, costs variation and mortality associated with those prescriptions is charged to Walmart.

Q But if you add up all of the conduct you're seeking to allocate, you've left out 98.66 percent of the conduct, haven't you?

A The defendants, according to Dr. McCann's flagging and the regression that apportioned variance in mortality attributable to shipments, led to the conclusion that 1.3 percent of the variation in mortality in -- I think this was Lake County -- is allocable to defendants' challenged conduct.

Q Sir, you've -- I want to focus on your language for a moment.

The defendants, according to Dr. McCann's flagging, and the regression, you're talking your regression?

A Yes.

Q So we could say the defendants as I use Dr. McCann's flagging in my regression apportioned a variance in mortality attributable to shipments that led me to the conclusion that 1.3 percent of the variation I think is allocable to defendants.

If we put the nouns in there and the nominatives of those predicates, that's what we got, right?

A Yes, that's correct.

Q So your regression analysis says 98.66 percent of even a situation like I showed in exhibit -- I mean, in hypothetical 1 is not the responsibility of Walmart, true?

A No.

Q Walmart --

A That's not what I said.

Q Okay. So Walmart's and all of the defendants put together by your analysis can never pay more than 1.34 percent of the harm, right?

A Of all of --

MR. MAJORAS: Objection, Your Honor.

THE COURT: Overruled.

You can answer, Doctor.

A It is my opinion that for Lake County, 1.3 percent of the harm of the costs of abatement is allocable to the defendants' challenged conduct as specified by Dr. McCann, yes.

BY MR. LANIER:

Q Now, Dr. McCann didn't specify 1.34 percent.

A No.

Q Okay.

A That's not what I said.

Q 1.34 percent is your figure, and your regression analysis says that the defendants can never pay -- should never pay more than 1.34 percent of the abatement cost for their damage. That's what you say, isn't it?

A No.

Q Sir, your whole model is 1.314 percent, isn't it?

A Yes.

Q And for Lake County, it's never going to be higher, that's what you apply year after year after year, true?

A Yes. That's correct.

Q Never gets higher?

A It's 1.34 percent of the present value of the costs of abatement, yes.

MR. LANIER: Thank you, sir.

That's the end of my road, Your Honor. Pass the

witness.

THE COURT: Good time to break for lunch. We'll recess until 1:10, and then we'll hopefully conclude more expeditiously with redirect and recross. So have a good lunch.

(Luncheon recess taken at 12:08 p.m.)

- - -

AFTERNOON SESSION

- - -

(Court resumed at 1:17 p.m.)

THE COURT: Doctor, you're still under oath from this morning.

THE WITNESS: I understand.

MR. MAJORAS: May I proceed, Your Honor.

THE COURT: Yes, Mr. Majoras.

MR. MAJORAS: Thank you.

REDIRECT EXAMINATION OF DANIEL KESSLER

BY MR. MAJORAS:

Q Dr. Kessler, I'm going to ask you a number of questions, and I'm probably going to jump around a bit on topic matter and possibly even documents. So if at some point I lose you let me know, and I'll try to reorient you. Okay?

A Yes.

Q Now, you testified that your regression analysis is

based on opioid mortality and opioid shipments, is that right?

A Yes.

Q Does that mean you are only allocating with respect to mortality?

A What the regression analysis does is allocate variance in mortality to shipments and to other factors.

Q But the use of the mortality figure alone, is that only so that you can allocate with respect to mortality in your results?

A No. No. I mean, the regression, because the dependent variable is mortality, that's what it's doing, but the purpose of it, the underlying purpose is to then allocate other non-mortality harms based on how mortality is allocated.

Q And that's because you're using the mortality rate as a proxy for overall harm, is that right?

A Yes.

Q If I could ask you to -- well, put it up on the monitor for you. If I can turn you to your slide deck that you and I went through yesterday.

A Yes.

Q And in particular, page 16?

A Yes.

Q I'm just waiting for it to come up on my screen.

Dr. Kessler, do you have it on the screen in front of you?

A No.

Q Give us just a moment, see if we can pull that up.

A There you go.

MR. MAJORAS: Success by magic.

Thank you, Mr. Pitts.

Q If you look at Slide 16, Mr. Lanier asked you quite a few questions about Step 3. Do you recall that?

A Yes.

Q Now, in Step 1 and 2, you calculate the percentage that you believe is allocable as to each of the pharmacy defendants, right?

A Yes. The percentage in -- of variance in opioid-related mortality allocable to the pharmacy defendants' challenged conduct, yes.

Q So if you've determined what the percentage was that you believe is allocable, you then multiplied it times the total -- I'm sorry -- the total re -- abatement costs, right?

A Yes.

Q So anything remarkable about doing that math?

A No. It's just the product of the percentage and the total size of the pie. Nothing magic there.

Q So the plaintiffs have said this is the size of the

pie, and you multiply each allocable percentage of each defendant by that total, correct?

A Yes.

Q And then you also multiplied it by the totals as they've been restated by you because of the overstatements in the plaintiffs' numbers?

A Yes.

Q And you report both of those results, we saw them yesterday?

A Yes.

Q Let's go -- let's go take a look at Step 1 of the slide. Step 1 is your regression analysis, right?

A Yes.

Q What's your experience in doing regression analyses?

A Well, I've been estimating regression models for more than 25 years. I've written, I don't know, 40 peer-reviewed papers using regression analyses maybe.

Q What is the value of a regression analysis in trying to isolate specific conduct to harm?

A The -- what a regression does is take the variance in some outcome variable and apportion it among a number of, you know, input variables or X variables, and so that's what -- that's the purpose of it is precisely to apportion variation in something among many factors.

Q In this case you looked at a variety of factors

specifically relating to the facts in this case, right?

A Yes.

Q And in writing your report, you wrote it specifically for the use in this litigation in helping to understand the application of those facts to the abatement costs?

A Yes.

Q In doing so, you also critiqued expert reports of plaintiffs' experts?

A Yes.

Q You would agree that much of the information in what you did was confidential at some level?

A Oh, yes.

Q So is it -- Mr. Lanier seemed to be surprised that you had not published an article about it, is that surprising to you?

A No. I mean, in fact I -- I'm not allowed to publish an article using the mortality data.

Q Speaking of publications, did we -- I believe this morning Mr. Lanier came back and you were able to take a look or hand him the final version of your article on The Prevalence and Trend in Opioid Use Disorder in the United States. Is that right?

I read the wrong article. I'm sorry. Let me back up.

I've adequately confused myself.

This morning you were able to identify the article

that you had published where you looked at whether you had disclosed potential conflict information, is that right?

A Yes.

Q And you put that on the record this morning, correct?

A Yes.

Q And are you satisfied that you have appropriately made the disclosures within the academic community that are required?

A Yes.

Q Let's do a comparison.

You had also seen this morning, and I'd ask to bring up CT3-II-DEMO-008. This is the article by Dr. Keyes that was recently published, if you have that in front of you.

A Yes.

Q We'll put it up on the screen, too.

A Yes, I have it.

Q And if you look at the bottom of this article by Dr. Keyes, can you see in the footnotes that it was accepted for publication on April 4, 2022, right?

A Yes.

Q Why don't you turn to page 5 of CT3-II-DEMO-08.

If you look in the right-hand column, there's a section that says "Declaration of competing interest." Do you see that?

A Oh, yes.

Q And it says here, KMK and CR. You understand KMK to be Dr. Keyes?

A Yes.

Q "KMK and CR have been compensated for expert work in litigation," do you see that?

A Yes.

Q Doesn't identify that she's working for plaintiffs?

A No.

Q Doesn't identify the number of cases in which she's working in?

A No.

Q It doesn't identify the specific entities that are the plaintiffs in those cases?

A No.

Q And it says she's -- that she and her coauthor have been compensated; she doesn't disclose at all that she's continuing to work in the opioid litigation, does she?

A No.

Q Switching gears again. This time I would like to have you take a look at P04900, which is a Partner Solutions document that Mr. Lanier talked with you about this morning.

A Yes.

Q Do you have that in front of you?

A Yes.

Q First, do you recognize this as the document that you

and Mr. Lanier talked about this morning?

A Yes.

Q And in it he pointed you to clients, the first column, clients with Opioid Use Disorders, right?

A Yes.

Q And that group of clients comes out of -- if you look at the top of the screen -- 9,666 adults, is that right?

A Yes.

Q Do you ever total the total number of clients that are identified in that column?

A No.

Q I've done that, you can do it if you would like. I will tell you that my math says the total number of clients, 12,031, does that look right to you?

A That's odd, but I -- certainly if you say so, I believe you.

Q So why is it odd?

A Because then that means that it can't be -- oh, it can't be unique people, that's why. That was my concern.

Q If you look at the top -- in fact, do you see, I got a little circle around SFY, and I will tell you that stands for state fiscal year. State fiscal year 2020. Do you know whether the state fiscal year starts -- the actual state fiscal year starts in 2019? In other words, the fiscal year used a different number than the calendar you or I would

use?

A I have no idea.

Q Well, I'm going to ask you to assume for me that the state fiscal year for 2020 started in July of 2019. If that's the case, you would agree that the amount being reported here is somewhere in the neighborhood of 15 months of data, right?

A Yes.

Q Then if we go in the same document, which is P04900 on page 1, do you -- again, look at the first row. These are clients, and in this case it's children, correct?

A Yes.

Q And, again, I will tell you -- and you can tell me if it looks wrong to you, but I have calculated that entire column to be 4,474. Does that look right to you?

A Yeah. That looks -- I mean, I -- I certainly believe you if you say so, yes.

Q And, again, if you look to the top of P04900, what are the total number of clients described in this document who are children?

A 3,284.

MR. MAJORAS: You can take that down, Mr. Pitts. Thank you.

BY MR. MAJORAS:

Q We were speaking a moment ago about regression

analysis, and Mr. Lanier asked you a number of questions about whether your method had been tested in academic literature. Do you recall that?

A Yes.

Q What about the use of regression analysis for the purpose you use it here? Is that something that has been reported in the academic literature?

A Yes, to apportion opioid-related mortality among different sources, yes.

Q And do you know how many different articles have talked about the use of regression analysis in that regard?

A Well, I mean, I cited a few of them in my report. I don't know how many there are in the whole world, but I'm familiar with at least a few of them.

Q In your opinion, the use of -- your use of the regression analysis and the way you've done it in your report, is that outside the way regression analysis is used in the academic literature?

A No.

Q Is it consistent?

A Completely.

Q Explain why.

A I mean, the question is, you know, how do you apportion variance across areas in opioid-related mortality, and there's several papers that do precisely that, three of

which I cited -- I mean, I may have cited even more than that, but I can just name three just sitting here.

Q Yesterday you mentioned a publication called *The Reference Manual on Scientific Evidence*.

A Yes.

Q What is that?

A As I understand it, it's a guide to the federal courts about proper use of scientific evidence, including regression analysis.

Q And in particular there's an entire chapter dedicated to regression analysis in that manual, is that right?

A Yes.

Q And in -- you've reviewed that chapter of the manual?

A Oh, yes.

Q And is your use of regression analysis in this case consistent with the evidence manual?

A Yes.

Q I believe you had some questions earlier today about testing your regression model. Do you recall those?

A Yes.

Q How did you test your regression model?

A Well, as I testified, I did one thing that I standardly do when estimating regression models is to vary the set of control variables somewhat and examine whether or not the coefficient of interest here, that would be the

association between shipments and mortality, changes very much, because if it does, that would indicate that the results are sensitive to the particular modeling choices that the analysts may have made when she first specified the model.

And so in this case I varied the set of control variables and found that the associations that I had estimated did not vary very much.

Q Do you recall the specific control variables that you used?

A Yes. They're in my report. I mean, I can read them to you.

Q Please tell us what they are and specifically what page of your report you're referring to.

A Sure.

So the first set of control variables in the model are shipments, and one of the purposes that I designed this model for was to allow for the effect of lag shipments, that is to say shipments in the past, to affect mortality in the present.

So, for example, for 2006, I allow not only 2006 shipments to affect 2006 mortality, but 2005 shipments, 2004 shipments, 2003, '02, '01, '00, '99, '98, and '97, nine lags, because I understand that a part of plaintiffs' theory is that lagged shipments may affect present mortality, so I

wanted to account for that as well as current shipments.

I'm sorry.

Q And if you look at -- I don't have a page number, but if you look at your Appendix E?

A Yes. That's what I'm looking at.

Q Okay. And if -- and this is in -- just for the record, it hasn't been introduced. Appendix E is the results of your analysis for each of these differences that you've identified, is that right, or potential differences?

A Yes. These are the regression results. This is the association between prescription opioid -- there's two columns, one for prescription opioid mortality and one for illicit opioid mortality, and then the columns report the impact of each of the shipments variables on those two outcomes.

Q So on the screen in front of us we have the very first page of exhibit -- of Appendix E, is that right?

A Yes.

Q This is Appendix E of your report, correct?

A Yes.

Q And this reports the results through the seven years that you regress, is that right?

A The seven years of lags, yes.

Q And if we turn to the next page, it reports the final two years that you've analyzed?

A Yes.

Q '8 and '9, is that right?

Is that right, sir?

A Yes.

MR. MAJORAS: And for the record, Dr. Kessler's report has been identified as Walmart MDL 01612.00059. Actually that's where the start of the appendix is, Appendix E.

Q What other variables did you look at in your analysis?

A So I also examined the effect of the counties' gender distribution, the percent male, the effect of the counties' age distribution, so there -- that's captured by the percent of people under 15, 15 to 29 years, 30 to 34, 45 to 64 years, and then 65 years and older.

Q And you report those here on page 60 of the exhibit, is that right?

A Yes.

Q And if you flip over, the final group you just described is -- I'm sorry, that -- it ended on that page.

What other variables did you look at?

A I looked at the distribution of ethnicity in the county, so that would be the percent white, percent black, and the percent Hispanic, with the -- the category not captured is all other ethnicities categories, and that's -- when I say not captured, it's because in -- in a regression

analysis when you're putting in categories or percents that add up to one, you have to sort of leave out one of them because you're only able to estimate the effect of one of the ethnicity categories, for example, relative to whatever the base group ethnicity category is that you define, and here the base group ethnicity category is "all other ethnicities."

Q And if, again, if you go through the appendix, what other variables did you analyze?

A The distribution of education in the county where the variables were the percent less than high school, percent high school, percent some college, with the base category being college or more.

The employment ratio, which is the proportion of people who are in the labor force.

The percent unemployed, which is the proportion of labor force participants who are unemployed.

Then if you turn the page, the percent of the county, that's considered urban according to census standards, the poverty rate in the county, the median household income in the county.

And then I included a distribution of industries in the county because there's evidence from other work that the industrial distribution in the county affects demand for opioids. Counties that have had very, you know, hard

industry -- industries that have -- you know, take a toll on their workers' health ultimately have higher demand for opioids.

So the distribution of industries I included were agriculture, manufacturing, construction, utility -- oh, agriculture, mining, construction, utility, manufacturing; retail and transportation; financial and professional services; healthcare and education services; then repair, maintenance, and other services.

Then I also included the occupational distribution, which is another factor that may affect demand for opioids; the percent in management, business, science, and arts; the percent in service occupations, the percent in sales and office, percent in natural resources and construction and maintenance occupations.

Then I included some controls for the healthcare supply available in the county.

Q Why did you do that?

A Because that also may affect the supply of opioids.

Physicians per capita, dentists per capita.

Then other controls for the healthcare, insurance in the population in the county, the percent that's eligible for Medicare, the percent that's enrolled in Medicare. Oh, I should have grouped hospital beds per pop up with the other health supply factors, and hospices per pop.

Q Per pop. is population?

A Yes.

Then also factors like the number of hospital beds available, short-term general hospital and long-term general hospital beds, as opposed to all hospital beds.

Then the veterans per population, the percent disabled per population, the percent uninsured per population.

Then I included a series of health factors, which was intended to capture the demand for opioids, and those are the percent of the population reporting binge drinking, reporting poor or fair health. The number of -- percent of population reporting numbers of poor physical health days, poor mental health days. Percent smoking, percent with diabetes, percent obese, and cancer deaths per hundred thousand population.

Q When you looked at all of these different variables, could you just give the Court some sense of what it really means to include these in the -- is this a simple arithmetic calculation?

A Well, the purpose of including these factors was to try to isolate the effect of shipments from the effect of all the other things that may be going on in the counties across the country. Like the health of the population, like the industrial distribution, like the socioeconomics and age distribution of the county. And -- yeah, that's the reason

for including them in the regression model.

Q And having run all of these factors through your regression model, what was your conclusion in terms of the confidence in the results of your model?

A I'm very confident in the results of them. I mean, I report the permanent effect of shipments in my report, and that's the -- the effect of a unit increase in shipments holding constant all these other factors.

Q If you turn to -- there's a few pages ahead, you may be able to identify it. It has -- it's called Association between Per Capita Shipments and Opioid Mortality Rates, and at the very top first column, just so you can find it for me, is negative 21.0981F, so it's not a part of us. Just for the record --

A Oh, yeah, this is the last page of the regression output, yes.

Q Okay. So I can identify this for the record, this is in Walmart MDL 01612, page .00066. Is that correct?

A Yes.

Q Now, I interrupted you. What is this?

A So this is the constant term in the regression that it's reporting. Then below that I report the sum of the shipment variables, so that is what a unit permanent increase in shipments -- the association between a unit permanent increase in shipments and mortality.

And so I -- I just add that up for the reader. For prescription opioid mortality, that's .652. And for illicit opioid mortality, that's .434.

And then below that I report the standard error of that estimate, the standard error of the sum of the coefficients. And for prescription opioid mortality, that's .200. And for illicit opioid mortality, that's .408.

And then right below that I report the confidence bounds, the lower and upper bound of 95 percent confidence interval, which is just going to be, you know, 1.96 times the standard error, you know, plus or minus the coefficient.

And then the T statistic and P value.

Q So now I believe your testimony earlier was that your -- if you look at the statistical significance of your findings, you found the results for the prescription opioid mortality rate column to be statistically significant?

A Yes. There is statistically significant association between a permanent increase in shipments and prescription opioid mortality.

MR. LANIER: Your Honor.

THE COURT: Yes.

MR. LANIER: I wasn't provided a copy of this, and so I don't have it, not knowing that it was going to be used. I don't mind that and I don't want to interrupt what Mr. Majoras is doing, but I would have one question off of

this document, if I could just ask it right now, and then I won't need to go back to this document or get a copy, or anything like that.

MS. FUMERTON: Mr. Lanier, I provided you a copy of this document yesterday.

THE COURT: Let's see if we can get you a copy.

MR. LANIER: That would be great. Thank you, Judge.

BY MR. MAJORAS:

Q Dr. Kessler, I'm not sure I got this answer. I apologize.

A Go ahead.

Q In terms of the illicit mortality rate per 100,000, in particular, what is it that you are measuring here?

A The .4 -- the .434 number is the association between a unit increase in shipments as measured in MMEs per capita per day, and illicit opioid mortality per hundred thousand population.

Q Is that result statistically significant?

A No. No, it isn't, not at conventional levels.

Q Do you recall you had some questions about slots and Dr. Alexander's description of slots?

A Yes.

Q So I'm going to -- -

MR. MAJORAS: Mr. Pitts, if I can go to the ELMO, please.

Q Just so that there's no confusion in the questions that you were being asked about what Dr. Alexander testified about, you see on the screen his testimony from a couple days ago when he testified.

And the question here, "From the pool of persons that Katherine Keyes estimates to suffer from OUD, you then estimate how many of them will obtain treatment, correct?"

He responds, "Yes, although I think the value 2,267 is really better thought of as a treatment slot, and we discussed this a bit earlier."

And to finish up, he says, "In other words, I'm not suggesting that there'd be 2,267 unique people that all get one full year of treatment. I'm suggesting there may be 200 -- I'm sorry -- 2,267 treatment slots in that year."

Okay?

A Okay.

Q So if we look back at Dr. Alexander's redress model for Lake County, which is P23105A -- we'll pull this up on the screen --

MR. MAJORAS: Mr. Pitts, if I could turn it over to the other monitor. Thank you.

A Yes.

Q Okay. And in particular, I'd like to look at page 15

of that.

A Yes. I'm with you.

Q We looked at this yesterday, this is a pretty simple question. When you were first analyzing Dr. Alexander's report, you had his redress models in front of you, right?

A Yes.

Q That's in part this document?

A Yes.

Q And in each of the line items here he talks about individuals, right?

A That's -- yes, that's what it says.

Q And then we've seen what he said differently at trial, is that right?

A Yes. I -- yes. That's not -- he said something that's not the same as this, yes.

Q So I'd like to ask -- you were asked some questions about the RAND report, do you recall that?

A Yes.

Q And I have just a few items here.

And if --

MR. MAJORAS: Mr. Lanier, if I might ask you if I could get a couple of the little drawings you made with the circles that had OUD population and heroin.

MR. LANIER: It's in this folder somewhere. I can try to find it or I can redraw it for you really fast.

MR. MAJORAS: Thank you. I'll go forward.

Q Dr. Kessler, if I --

MR. MAJORAS: If I can go back to the ELMO --

MR. LANIER: Here it is.

MR. MAJORAS: Even better. Thank you.

BY MR. MAJORAS:

Q So do you recall testifying about this drawing of Mr. Lanier's?

A Yes.

Q And the larger circle -- well, the entire circle is the Opioid Use Disorder, correct?

A Yes.

Q And then within that there's a subset of individuals who may be frequent heroin users?

A Yes.

Q Does the fact that someone is a heroin user automatically put them in the population of Opioid Use Disorder?

A No.

Q And in fact, one of your criticisms of what Dr. Keyes does is that by including all heroin users, it overstates the OUD population?

A Yes. You know, while -- while heroin users obviously are much more likely than the population average to have OUD, it's the share of people who used heroin in the last

year who are -- have OUD as in the high 50s, I believe.

Q And in terms of determining -- I'll just take this down. Thank you.

Just about done.

One question, which typical in the courtroom often elicits a few others, but I'll start with one.

At the end of your testimony when Mr. Lanier was asking you questions, he had talked to you about what accounts for the other 98 percent approximately of potential explanations for the opioid -- opioid harm, is that right?

A Yes.

Q Okay. Now, you identified or you had testified that you had not tried to isolate each of those other factors, is that right?

A Yes.

Q But you are -- in writing your report you had identified other potential categories to make up that 98 percent, is that right?

A Oh -- oh, yes. I mean, all the -- all the control variables in the regression, for example, are absorbing some of that variation; the health and socioeconomic conditions of the counties, for example.

Q What about other parties who may have been involved in the distribution of legal prescription opioids?

A Yes, that's another factor.

Q And what about parties who are involved in the illegal distribution of opioids?

A Yes, that's also another factor.

Q And that would be both illicit opioids like heroin and fentanyl, as well as prescription opioids that perhaps someone took from their parents' cabinet?

A Well, I mean -- any prescription shipments would be accounted for in the model, so the factors -- so that would be folded into the shipments variable, and then parceled out when we looked at the number of flagged prescriptions according to Dr. McCann.

Q So, in other words, you did not try to isolate the percentage contribution, if you will, of these other potential players?

A No.

Q And in particular, that regard, Mr. Lanier had drawn you a couple stick figures towards the end of your testimony. Do you recall that?

A Yes.

Q And he gave you some examples of, for example, of a certain individual had started with a prescription, then ultimately went on to other products, as part of his questioning?

A Yes.

Q Now, you don't have or did not have any data in this

case that could allow you to trace an individual prescription to an individual person, right?

A No. I don't think I had individual identifiers.

Q And certainly you did not have information by which you could have traced through once someone received a prescription, all the other things that person may do over some period of time?

A Certainly I would not have that.

MR. MAJORAS: Thank you Dr. Kessler. I don't know if any other defendants have --

MR. DELINSKY: Your Honor, I just have a few questions.

THE COURT: Okay.

CROSS-EXAMINATION OF DANIEL KESSLER

BY MR. DELINSKY:

Q Good afternoon, Dr. Kessler. I just have a -- hopefully not even a minute of questions. Okay.

A Go ahead, please.

Q My name is Eric Delinsky, I represent CVS. I think we shook hands in the hallway, correct?

A Yes.

Q And that was the first time we've met before, correct?

A Yes.

Q Okay. I think the record's clear on this, the only purpose of my questions is to ensure that in response to

some questions that Mr. Lanier asked you, you testified that you have accepted Dr. Alexander's plan as a given. Do you recall that testimony?

A Yes. I mean, I accept the parameters -- the treatment parameters of his plan as given. I don't accept the cost estimates of his plan.

Q Let's focus on those treatment parameters or treatment measures that are in Dr. Alexander's plan, okay?

A Yes.

Q When you say that you accept them as given, did you mean to suggest that you are endorsing any of those treatment measures or treatment elements?

A No.

Q Okay. You did not mean to suggest that you agree that any of the treatment measures of Dr. Alexander's plan are warranted?

A No. I have no opinion on that.

Q And that's exactly my last question. You are not providing any opinions on whether the elements of Dr. Alexander's plan are warranted, correct?

A No, I'm not providing any opinion on that.

MR. DELINSKY: That's all I have. Thank you Dr. Alexander -- excuse me. Thank you Dr. Kessler.

RECROSS-EXAMINATION OF DANIEL KESSLER

BY MR. LANIER:

Q I just want to cover the things you were asked. Mr. Majoras asked you does the fact that someone is a heroin user automatically put them in the population of OUD; you said no, remember?

A Yes.

Q In reference to the drawing you and I did together, my drawing didn't have "heroin users," it had "frequent heroin users," right?

A Your drawing says frequent heroin users, yes.

Q Because that's what the RAND report said, frequent heroin users, right?

A I -- if you can point me to the report, I can confirm that.

Q I'm not going to take the time to do that. The judge has made good notes.

Assume with me that it does say that. If it says frequent heroin users, then you will put them in the population of an Opioid Use Disorder, won't you?

A I don't know.

Q And -- okay, then let's go there. You're not qualified to diagnose someone under the DSM as to whether or not they have a use disorder, are you?

A No. I couldn't diagnose a patient.

Q So you can't say what is a use disorder and what is not beyond the criteria that is established by the DSM, fair?

A Yes. That's the standard that I use.

Q Next subject.

The 98 percent liability are under your allocable cost model, 98 percent plus, remember?

A 98 percent --

Q Responsibility under your cost allocation, over 98 percent is not attributable to these three defendants by your cost allocation, true?

A Not attributable to their dispensing behavior --

Q Fair enough.

A -- as -- may I finish?

Q Yeah.

A -- as specified by Dr. McCann.

Q Well, no, not as specified by Dr. McCann; based upon Dr. McCann's analysis of how many red flags were disregarded?

A Yes.

Q Thank you.

Now, so other parties, legal and illegal, and you kind of took out the filing cabinet stuff.

Which variables in your regression analysis account for the other parties' actions?

A Well, the regression analysis takes out factors like socioeconomic and demographic factors.

The parties and the other factors are absorbed by the county and year fixed effects. That would be what's taking out these other -- all these other factors.

Q Well, then let's look a little bit at your regression analysis in some detail, now that it's been supplied and I can cross-examine you on it. All right?

A Of course.

Q You said you based it off of shipments, true?

A Yes. The shipments as specified in ARCOS.

Q And let's make sure the record is real clear.

When you did your work, you found that the illicit mortality rate per 100,000 is not statistically significant so that you can rely upon it, true?

A The association between shipments and illicit mortality is not statistically significant, yes.

Q You've got a P value on the sum of shipment variables, that is .287, and to be statistically significant you would need it to be .05 or less, true?

A At conventional levels, yes.

Q Right at the levels that courts have traditionally considered acceptable science in a courtroom, a 95 percent confidence interval, right?

A The number isn't statistically significant, yes.

Q Because it is in excess of .05, true?

A Yes.

Q And if you look in greater detail at what you're relying upon in Appendix E, we're going to find that a lot of these are not statistically significant, isn't that true?

A Several of the coefficients on shipments in the illicit mortality model are not statistically significant.

Q I'm --

A And -- I'm sorry, go ahead.

Q No. I'm circling the ones that are not statistically significant that you go ahead and rely on. Do you see these?

A Yes. You're noting which ones are and are not statistically significant.

Q I'm circling the ones that are not statistically significant. Excuse me. That's a mistake on my part.

Do you see the ones that I'm circling, the P values?

A Yes.

Q These are not statistically significant, correct?

A Yes.

Q Yes, I am correct.

And I could keep going page after page after page, because you have so many that aren't statistically significant, true?

A Some of the variables are statistically significant

and some aren't.

Q And now that we've got your variables on the record for me to cross-examine, you have for your variables gender, age, ethnicity, education, employment, urban, rural, poverty rate, median household income, industrial distribution, occupational standing, healthcare supply available, insurance, beds available, VA, health factors.

These are the things that you're distinguishing out, aren't you?

A Yes. I wanted to know the association between shipments holding constant these other factors.

Q In other words, if you exclude these other factors' effects, then you've got your regression analysis done and you can consider how much is attributable to these defendants, right?

A Yes. I wanted to parcel out the variance in mortality associated with, like, the age distribution of counties apart from defendants' challenged conduct.

Q Because what you've told the judge is you've got a person here, and that person may be of an age or may be of a job or may be of an ethnicity that is part of the reason they are having OUD mortality, right?

A Part of the -- it's not OUD mortality, it's opioid mortality that I'm measuring.

Q Opioid mortality --

A Yes.

Q -- might be the age, the job, and the ethnicity, for example, as opposed to the oversupply, right?

A As opposed to shipments, yes.

Q In other words, you're saying that the companies should not have to pay for the vast majority of the costs because you can attribute that just to the fact that these people were of a certain age or had a certain job or were of a certain racial mix, among other such variables, correct?

A No. That's not what I'm saying, no.

Q Did you allow these factors that you listed to reduce in any way the responsibility of these companies?

A I mean, I understand my objective to determine the portion of challenged conduct -- the portion of mortality associated with challenged conduct. Mortality attributable to the demographics of a county has nothing to do with the challenged conduct. I mean, this is variation across counties, so that's what -- that's what I did.

Q I'm going to come right back to that, but I want to mark as the Exhibit E where I noted the statistically insignificant changes. It is from document Walmart MDL 1612.59 and following.

MR. LANIER: And I'm going to add to those, Your Honor, with permission from the Court, plaintiff tender so that those are marked and available for the Court.

Q And I didn't circle all of the statistically insignificant on all of the pages, I quit after a couple, but if we'd kept going we could have found more, correct?

A You are circling the coefficients that are statistically insignificant.

Q All right. Let's go ahead, and for thoroughness just make sure we get them all.

By the way, until I pressed on this, you had never informed the Court that you had statistically insignificant data that you were using to draw your conclusions, did you?

A These coefficients are not -- are not themselves inputs to the calculation. This was part of the project of apportioning the overall variance to these different factors.

Q Right. But this is the appendix that you went to with Mr. Majoras to explain my challenge to you of how you did your math and what all you had done to try to determine your opinions, and this was your appendix, correct?

A Yes. This is my appendix.

Q And this is what your research indicated when you ran your regression analysis of what was or was not statistically significant, true?

A Yes. Some of these factors are statistically significant and some of them are not.

Q Right. There are a couple that are.

All right. Now I want to go back to where I was when Mr. Weinberger reminded me through Ms. Fitzpatrick to mark that as an exhibit, and I want to make sure that the judge has a full understanding and that we're on the record with this.

So here is an abatement model for the counties. And I'm just going to say this abatement model of Dr. Alexander, et al., says the abatement needs to be 100 -- either $100, or 100 percent, either way. Are you with me?

A Yes.

Q Now, you did regression analysis to ultimately at the end of the analysis establish that these defendants have less than two percent allocable costs, right?

A Allocable to their challenged dispensing conduct.

Q Correct.

A Correct.

Q Now, what moved you from 100 percent to less than two percent? What were these factors?

A Well, I mean, it's -- the factors in the regression, and then there's also the -- the fact that the defendants' overall market share is not 100 percent of the market, and the fact that the challenged conduct of the defendants is not 100 percent of their dispensing.

Q All right.

A Those three things.

Q So let's do that.

So the factors that are things like age, ethnicity, income, city or rural, industry, insurance, all of those factors you detailed, and they help you reduce the 100 percent, true?

A I can't say if it's those factors or other variables in the regression, but it is -- it is certainly true that the regression is going to parcel out some of the variance in mortality.

Q And the other two areas that you mentioned are market share and other parties or other entities we should say, right?

A Market -- the market share of the defendants and then the share of defendants' dispenses that Dr. McCann flagged as improper.

Q And then the third bucket are other entities, right?

A Yes. Other entities also qualify in there.

Q Now, how did you determine how much to reduce because of other entities?

A Well, that's what the regression does, is take the variation in mortality across counties and ask what portion of it is associated with the shipments as opposed to being associated with the fixed characteristics of counties, with the time period, with the age distribution, et cetera. And it was the portion of the variance in mortality associated

with shipments that I started with, and then that was Step 1.

Then Step 2 was to take the dispenses that Dr. McCann flagged as improper and use that to determine how much of the shipments should -- according to Dr. McCann -- not have been dispensed.

Q Sir, I'm not fussing any of that. I'm just saying, can you tell us how much all of these counties' specific facts, like age, ethnicity, income, et cetera, that you listed just now to Mr. Majoras and the Court, how many of those are -- how much did those reduce the 100 percent?

A Yeah, I don't -- I don't know the answer to that just sitting here today.

Q So if the Court decides that the law is such that you can't reduce how much you owe because you filled the prescription for an old person, or you can't reduce it because they were a minority, or you can't reduce it because they didn't have enough money so they're more likely to get addicted, if the judge doesn't allow this deduction from culpability, you do not know how that affects your model?

MR. MAJORAS: Objection. Scope. Expertise.

THE COURT: Overruled.

A Yeah. That's just not what I'm doing at all. I mean, the question that I'm seeking to answer is if -- if shipments are associated with mortality independent of the

characteristics of counties and some subsets of defendants' shipments were improper, how much of mortality is associated with defendants' improper behavior? That's what I'm trying to do.

BY MR. LANIER:

Q Yeah, but if you can't take away from the mortality these specific characteristics of the people who died, if that's not allowed to be taken away, how much does it change your opinion of the responsibility? What's the percentage?

A I can't calculate that just sitting here today.

Q By the same token, if we take that portion that you can't calculate and look at what's remaining of the other two buckets, bucket two and three, the market share of the defendants and the red flag share and other entities, isolate for his Honor how much you are assigning to other entities.

A Well, I -- I mean, I can't -- I just can't do that physically sitting here today. It's -- you could conduct a study that did further apportion, but my understanding was to try to determine the portion of the variation in mortality across counties associated with defendants' challenged conduct as specified by the flags of Dr. McCann.

Q So, to bring this section to a close, the end result you got of less than two percent, you are not saying that the market share of these defendants on a pill-per-capita

basis is less than two percent, are you?

A No. I don't -- offhand, I don't know their market share.

Q Next subject.

The county document, Plaintiffs' 4900.

During the lunch break we worked hard to figure it out in regard to the questions that you had.

You remember Mr. Majoras asking you about this?

A Yes.

Q And I want to make sure that the record is precisely clear on this.

So first we do have a state fiscal year that's looking at 15 months, from July 1 of '19 through October 7th, 2020, correct?

A I don't know, I haven't seen this document.

Q I'm going to represent to you that that is what we have verified, that this is state fiscal year 2020, which started July 1 of 2019. Okay?

A If you say so, I'm happy to assume that.

Q All right. Thank you, sir.

And you don't have to assume, but you know that a bulk of that time in 2020 is also when there was COVID shutdown in most of the country, true?

A Yes.

Q Even within that 15 months with COVID, you've still

got a per-year figure of 1,356 adults where their primary diagnostic group for adults is 1,000 -- well, no. The one-per-year figure would be 1,356. Does that math seem right to you?

A I don't know. What is -- that's --

Q You don't know?

A Yeah. I mean, I'm just trying to --

Q Fair enough.

If it is, then you've still got treatment rates of 66.2 percent if your math is correct on how many OUD patients there are, or just under 18 percent if Dr. Keyes' estimate is used.

MR. MAJORAS: Objection. Based on facts not in evidence.

THE COURT: Overruled. He can ask the question.

BY MR. LANIER:

Q That's just math, isn't it?

MR. MAJORAS: On the per-year basis?

A Yeah, I mean -- my original concern was that the clients is not unique people, and I still don't know the answer to that.

BY MR. LANIER:

Q Well, I'll represent to you that if a client is in a facility, they are a unique person. If they check out of

that facility and they leave that treatment and then go to another facility, they would be counted as a second client in that event. Do you follow me?

MR. MAJORAS: Objection.

MR. DELINSKY: Objection.

MR. MAJORAS: Facts not in evidence.

THE COURT: I'll sustain that.

MR. LANIER: I just want to make sure that the record is clear at least that's what I'm suggesting, Your Honor, so thank you.

BY MR. LANIER:

Q Sir, 1695 clients. Claims 169, 148, right?

So 1695 clients, if that is a 15-month period, means that you're looking at 113 clients per month, right?

MR. HYNES: Objection.

THE COURT: He assumed it's 15 months, so that's -- he's asking if his math's right.

A 1695 divided by 15 is 113.

BY MR. LANIER:

Q Thank you. So if it averages out to 113 per month and you wanted a per-year average, you'd multiply it by 12 and you would get 1356. True?

A We still have the problem that I don't know if these are unique people or not.

Q Okay. And you're basing that on the asked questions

of Mr. Majoras about adding these up and getting 12,000?

A No. I'm basing that on the concern I expressed before Mr. Majoras ever pointed that out.

Q During the lunch break, did you bother to look at the back-up information on the back to show all the different people that would be treated in this treatment and what it was for?

A No. I didn't look at this over lunch.

Q You didn't look at the Methadone treatment, you didn't look at the buprenorphine or any of the rest of that, is that right?

A I did not review this document at lunch.

Q Next subject.

"I'm not allowed to publish an article using mortality data."

Says who?

A Well, if I -- what I -- I'm not exactly sure of the language that you're referring to, but the mortality data that I used in this case are confidential mortality data obtained under license from NCHS, and I'm allowed to use them only for the express purpose that the Government has licensed them to me for, which do not include me writing articles about them. If I wish to do so, I would need to apply to NCHS separately for that permission.

Q Do you not understand that you've made this

information public already by even testifying to it?

A So the license that I have from NCHS allows me to analyze the data and to make aggregates of it public in connection with this trial. What it prohibits me from doing is first using NCHS data for my own research without obtaining separate permission and disclosing anything with a cell size, I think it's ten or less, and I have complied with those rules.

Q But I mean, you've used it for your own research in this case, haven't you?

A No, I used it for the purpose of which it was licensed to me, which is the analysis in this case. I have not used it to write an article, which I am -- would be absolutely against the rules.

Q Sir, there's not anything you've said in here that you can't put into an article, you understand that?

If you can say it in here it's public knowledge. It's God and all creation are in here watching.

MR. MAJORAS: Is that a question, Your Honor?

BY MR. LANIER:

Q Did you understand that?

THE COURT: Well --

MR. LANIER: I'll ask it --

THE COURT: I think you should pose a question, Mr. Lanier.

BY MR. LANIER:

Q You understand this is an open court, right?

A Yes.

Q And you understand your testimony is publicly available, right?

A Yes.

Q And everything you're saying --

A Well, I don't know if that's true, but I certainly -- if you tell me it's true, I will assume it's true.

THE COURT: Well, I can tell you, sir, in our country, with very, very rare exceptions, everything in court is immediately -- anyone can come, anyone can watch, anyone can listen, so it's public.

THE WITNESS: Okay. I certainly respect his Honor's -- yes.

BY MR. LANIER:

Q All right. Last question.

You spoke that you had missing information, you didn't have enough information to trace prescriptions, to trace other actions, to give that kind of detail of responsibility. Remember that?

A I think what Mr. Majoras asked me was first was I able to identify individuals in the data that I have, and the answer to that is I believe no.

And then was I able to connect the data on

prescriptions that I have from the Ohio PDMP to other characteristics of individuals and other behaviors, and the answer is no.

Q Yeah. In other words, you don't have enough data to chase it down to those details, do you?

A No.

MR. LANIER: Thank you.

That's all I have, Your Honor.

THE COURT: Thank you, sir. I know been a couple long days, so safe travels back. We appreciate your appearance.

THE WITNESS: Thank you, Your Honor.

MR. HALL: Your Honor, may I address a matter of housekeeping for the next witness?

THE COURT: Yes.

MR. HALL: We've made --

THE COURT: I know everyone likes to -- the microphones work much better if you sit down.

MR. HALL: I wanted to advise the Court and the plaintiffs that we have made a determination that we do not intend to call Dr. Doyle or Dr. -- or Mr. Bruner, whose opinion Dr. Doyle relied on. And I wanted to alert the Court to that. So Dr. Chandra will be plaintiffs' last witness --

THE COURT: The defendants' last witness.

MR. HALL: Excuse me, defendants' last witness, and we have some housekeeping matters, some documents to introduce, some matters of exhibits to clean up, but no additional live witnesses from defendants beyond Dr. Chandra.

THE COURT: Okay. I didn't ask the plaintiffs, are you planning to call anyone in rebuttal? Or if you want to wait until after Dr. Chandra, that's fine.

MR. WEINBERGER: No, we don't have to wait for Dr. Chandra. There's just one issue that I will address that -- and it has to do with the Exhibit P4900, which is the spreadsheet document from Partner Solutions from Trumbull County.

We are going to move to admit that into evidence, and I, of course -- I gave Mr. Hynes notice of that. And so I --

THE COURT: We can take up -- I mean, we can take up exhibits now or we'll start with Dr. Chandra, do it at the end of the day or tomorrow. I mean, I'm sure the defendants has a lot of --

MR. WEINBERGER: The reason I bring it up now, Your Honor, and what Mr. Lanier stated on the record in reference to his questioning of this witness, is what our information is about this exhibit. And that is that of the numbers of clients are represented by individuals who sought

treatment at any of the county agencies covered by the Trumbull County Mental Health Recovery Board, and when a client -- when an individual begins treatment, that becomes individual number 1.

THE COURT: Mr. Weinberger, the point -- you can't testify.

MR. WEINBERGER: I understand that, but I have a point --

THE COURT: I mean, it's --

MR. WEINBERGER: If we're -- if this is not going to come into evidence, then we do intend to call April Caraway to explain the document.

THE COURT: Since it's unclear that there's been -- Dr. Kessler was unclear, because he didn't know and it wasn't his document. So I think you probably need to call Miss Caraway and she can explain it. It's come up -- unless there will be a stipulation to it. If there's not, then the only way to clear it up is have Miss Caraway, because the document came from her county.

MS. FUMERTON: Your Honor, if I can suggest perhaps we could caucus as defendants and also talk with plaintiffs about --

THE COURT: That's fine, but Dr. Kessler didn't originate the document, so he didn't know.

MS. FUMERTON: Yes, Your Honor.

THE COURT: If there's not a stipulation, then it won't be long, we'll have Miss Caraway identify it and she'll put it in her testimony, and the defendants can cross-examine her.

So there may be -- all right. So it's possible there will be Miss Caraway for rebuttal, okay?

MR. DELINSKY: Your Honor, am I understanding right that we'll take that up at the end of the day after we caucus, and in the meantime we should proceed?

THE COURT: No, you should proceed. The point is if there's no stipulation then the plaintiffs will call Miss Caraway on rebuttal, and she'll give her testimony.

MR. DELINSKY: Thank you, Your Honor. And with that, CVS calls Dr. Amitabh Chandra.

(Witness sworn.)

DIRECT EXAMINATION OF AMITABH CHANDRA

BY MR. DELINSKY:

Q May it please the Court:

Dr. Chandra, where are you from?

A Boston, sir.

Q You're a professor, correct?

A I am.

Q Where are you a professor?

A I'm a professor at Harvard University.

Q And what's your general field?

A Health economics and health policy.

Q And Dr. Chandra, could you pull that microphone a little closer to you?

A Is this better?

Q A little bit.

Are you here today to provide expert testimony?

A I am.

Q And just as a brief general matter, what's the general subject of the testimony you intend to give today?

A I'm going to discuss a method to apportion abatement among the actors involved in the asserted public nuisance.

Q Just give the judge some background regarding you first. You testified once before in a trial as an expert witness, correct?

A That's correct.

Q That was, help me with the timing, maybe two or three months ago?

A I believe it was very late March, maybe the last day of March.

Q Okay. And that was the first time you had ever testified as an expert witness?

A That's correct.

Q Then you gave a deposition in this case, correct?

A That's correct.

Q Okay. And other than that trial in March and your

deposition in this case, have you ever testified as an expert before?

A Not in court, sir.

Q Okay. You've testified to Congress, correct?

A That's correct.

Q And before other panels, correct?

A That's correct.

Q But not in court?

A Correct.

Q And so would it be fair for me to say you're not a seasoned in-court testifier?

A I am not.

Q I am going to show you what's been marked as CVS MDL 5015. You should have that, and it's one of the appendices to your report, it's your CV.

A Yes, sir.

Q You have that, okay.

And I am going to put that on the projector. Is CVS MDL 05015 a true and correct copy of your CV?

A It is.

Q The CV that was an appendix to your expert report in this case?

A That's correct.

Q I neglected to ask, the most obvious question is did you prepare an expert report in this case?

A I did.

Q And did that expert report set forth your opinions in this case?

A It does.

Q Okay. Now I want to go through your background here and introduce you to Judge Polster. I want to before we get to your CV, I want to ask you one of the most important questions. Do you have a baby at home?

A I do have a baby at home.

Q Is it your first baby?

A He is my first baby.

Q How old?

A He's 16 months.

Q Okay. And what's his name?

A Mikko.

Q He's sort of thrown a wrench into your schedule of sorts?

A Yes.

Q Where were you born?

A New Delhi, sir.

Q In India?

A Yes.

Q And how long did you live in New Delhi?

A Until the age of 18.

Q When you were 18 did you move to the United States?

A I did.

Q Where in the United States did you move?

A Just a few miles actually west of here, I started my education at Oberlin College.

Q And how long did you spend at Oberlin?

A A year.

Q And then after Oberlin where did you go next?

A I went to the University of Kentucky.

Q And was this to earn an undergraduate degree?

A It was, sir.

Q And if you look at your CV, it indicates that 1996 you earned your bachelor of arts from the University of Kentucky in economics. Is that true?

A That's correct.

Q Did you stay at University of Kentucky thereafter?

A I did.

Q What additional degrees, if any, did you earn at the University of Kentucky?

A I got my master's in economics and my Ph.D. in economics from there.

Q All from the University of Kentucky?

A Yes, sir.

Q Did you become a Wildcat?

A I am a Wildcat.

Q After you earned your -- let's stop there. Did you

specialize in any form of economics at the University of Kentucky?

A I specialized in labor economics, which is the study of labor markets, sir.

Q I don't want to chew up a lot of time with it, but would you just tell Judge Polster what your dissertation was on, because it's particularly interesting?

A Yes, I looked, Judge Polster, at the effect of Title 7 legislation on African American economic progress and the extent to which a policy of mass incarceration in the United States had created illusory economic progress for African Americans, because we have been incarcerating large numbers of them, which artificially raises their measured wages, because the least skilled African American men are not in the data anymore.

Q And was that sort of a beginning of an academic process for you, whereby you would analyze the causes of certain occurrences in the United States?

A That's right.

Q After you earned your Ph.D. from the University of Kentucky where did you go?

A My first job was at Dartmouth College in New Hampshire.

Q What position did you hold at Dartmouth?

A Assistant professor of economics.

Q And what year was it that you began as an assistant professor at Dartmouth?

A 2000.

Q And what did you teach?

A I taught a class in statistical methods, the use of economics and statistics to make sense of what's happening in the world.

Q And what kind of statistics did you work with?

A Regression, a lot of time series statistics, a lot of statistics around how you measure things using randomized control trials or observational studies.

Q When you were at Dartmouth did you begin to develop a particular focus in healthcare?

A I did.

Q Could you explain how that came about?

A Yes, Judge Polster. Dartmouth at the time had a number of physicians who were working very hard on problems concerning why is American healthcare so expensive, and despite being so expensive, why does it often not deliver what we would like to deliver?

And I didn't know anything about this, but I engaged with it because I thought it was a really important question. And so I spent a lot of time learning the relevant literature.

Q Now, at some point you moved from Dartmouth to

Harvard, where you're at today, correct?

A That's right.

Q When was that?

A 2005.

Q So how many years were you at Dartmouth?

A Five.

Q And when you came to Harvard, what position did you -- did you assume?

A I was still an assistant professor, sir.

Q And what did you come to teach at Harvard?

A When I came to Harvard, the first assignment I was given was to teach a class in empirical methods, the policy students at the Kennedy School of Government at Harvard.

Q And what does it mean to or what was this course on empirical methods about?

A So Kennedy School students are not economists, they're people who want to go into public service after the Kennedy School, and they need to understand the methods that are used in discussions of this type.

So my course covered methods from economics, methods from medicine, methods from epidemiology, with an eye to how you might use these methods to make sense of public policy and with the hope of designing better public policies.

Q Let's fast-forward to the present.

Can you walk us through the different professorships

you hold at Harvard?

A I'm a professor at the business school, so I'm a -- I'm an endowed professor at the business school at Harvard and I'm also an endowed professor at the Harvard Kennedy School of Government.

Q And at the Kennedy School at Harvard are you a professor of public policy?

A That's right.

Q In your capacity as professor at Harvard business school, are you involved with the MS/MBA program in the life sciences?

A Yes. It's a new program, sir, that I helped create and found.

Q Are you a chairman of that --

A I am the HBS Chair of that program, yes.

Q And have you been at Harvard continuously since the time you left Dartmouth?

A Yes, I have.

Q Okay. Are you also the director of health policy research at the Kennedy School of Government at Harvard?

A I am.

Q And is that a position involving a public outreach regarding all the health research generated at the Kennedy School?

A It is.

Q I want to talk about the courses you currently teach at Harvard and have taught, and then devolve to the kinds of students you taught, and then I want to hit your research, okay? And we'll try to tick through it pretty efficiently.

What courses do you teach at Harvard today?

A I teach several courses. The course I just finished teaching, I turned in grades yesterday morning, is called U.S. Healthcare Policy. It's the foundational course in health policy at Harvard University. By that I mean it's open to undergraduates, and the students in the class are undergraduates from Harvard College, students from the Kennedy School, students from Harvard Medical School, students from the Harvard School of Public Health, and law school students.

Q And what are the -- what's the kind of topics that you teach in your health policy class?

A I talk a lot about the kinds of questions that my students come to me with: How do we make sure that we insure the uninsured? What are the policy tools we have at our disposal? How do insure that once folks are insured they actually have access to high quality care?

What are the policy levels available to government to reduce racial disparities in healthcare? What kinds of policies do we need to induce meaningful innovation to disease, diseases like Alzheimer's and cancer, around the

world? I tend to focus in the class, from its title, on U.S. problems.

Q Do you also teach a class called causal methods?

A Yes, I taught that class from 2005 -- I haven't taught it in the past two years, but it is a version of what I taught at Dartmouth, but for Kennedy School students.

Q And can you just explain for the record what that class involved?

A Yeah. That class involves interrogating facts, research, data that people are using to advocate for certain public policies or medical policies. So we read journal articles from medical journals, we read journal articles from economics journals, from epidemiology journals, and we have a discussion around how you might order the different types of evidence as a policymakers.

Q And I was remissant on asking you this. Are you a health economist?

A I am.

Q And you're an expert on health policy?

A I am.

Q Okay. In teaching causal methods, was this a focus on causal methods in the context of health policy?

A Yes, it was.

Q Okay. So the kinds of information and data sets that you teach and work with within this class, are they data

sets pertaining to healthcare?

A Yes, they are.

Q Okay. Dr. Chandra, you told me about one of the case studies that you work through with your students in either the causal method or the health policy class, I can't remember which one, that you developed regarding hormone replacement therapy.

A Yes. That's right.

Q Can you just -- you know, again, quickly just tell the judge what that case study involves and what you learned in developing it.

A Of course.

Judge Polster, as you might remember, several years ago there were a series of articles that were written by my colleagues at Harvard advocating that women should take hormone replacement therapy because the hormone replacement therapy might actually confer a longevity advantage to them by reducing the risk of a heart attack. That was the hypothesis, that is the data that they assembled.

Subsequently a randomized control trial was done to test the observational -- the hypothesis from observational studies, and mind you, physicians had been prescribing hormone replacement therapy for women.

What we learned in the randomized controlled trial was not only that hormone replacement therapy not going to

reduce the risk of a heart attack, it was actually going to increase it. And so the case that I wrote for my students in the causal methods class was to help them understand how to make sense of conflicting data when you have a series of high quality peer-reviewed studies coming out of one discipline that then get ostensibly overturned by an RCT from another discipline.

I didn't do either of the studies, but the case is a way to get the students to engage in this very important policy debate.

Q Now, Dr. Chandra, in teaching this form of analysis and methods, I just want to walk through it, and I think you've already testified to it. You teach undergraduates?

A I do.

Q You teach students at the Kennedy School of Government?

A Yes.

Q You teach Harvard public health students?

A Yes, I do.

Q Medical students?

A Yes.

Q Does Harvard have epidemiology students?

A Yes.

Q Do you teach them?

A Yes, if they take my class.

Q You teach business school students?

A Yes.

Q And do you teach law school students?

A Yes.

Q The Robert Wood Johnson seminar you told me about, did I get it right?

A Yes.

Q Can you tell us about what that seminar is and what your role is in it?

A That was a seminar that we ran at Harvard University that was funded by the Robert Wood Johnson Foundation, and it was a very serious effort by the university and the foundation to bring together a number of disciplines that cared about healthcare and health policy in America.

So I represented the Kennedy School, Lisa Berkman and Ichiro Kawachi, they're both very famous epidemiologists, represented the Harvard School of Public Health. And we met once a week with Ph.D. students and we invited speakers from around the world to present their research to us. It was a very collaborative interdisciplinary seminar, where we would bring the tools of our own discipline into that seminar.

Q And I think I'm stating the obvious, the seminar focused on health policy issues and health policy problems?

A Yes, it did.

Q Okay. Do you research on your own and publish studies

and articles?

A I do.

Q What are some of the topics you've published?

A I've studied the high cost of U.S. healthcare. I've studied medical malpractice in the United States. I've studied the quality of healthcare received by patients.

I've studied the adverse effects of high deductible health plans on decision making by patients. I've studied medical malpractice. I've studied racial disparities in healthcare. I've studied innovation.

(Court Reporter interjection.)

A High deductible health plans and the implications of these high deductible health plans on the decision making by patients --

Q I apologize for interrupting. Keep going.

A I studied innovation in healthcare.

Q Have you written articles on particular medical conditions?

A I have.

Q What are some of the conditions you've written on?

A I've written on Alzheimer's and heart attacks and cardiovascular disease and diabetes, a number of articles.

Q Have you been published in medical journals?

A I have.

Q What are some of the journals you've been published

in?

A The *Journal of the American Medical Association*, the New --

Q Let me just stop you there, because we heard *JAMA*. Is that *JAMA*?

A That's the same as *JAMA*, yes.

Q Okay. What else?

A I published in *JAMA*, I published in *New England Journal of Medicine*.

Q Published in health economics journals?

A Yes. Published in health economics journals as well as general interests medical journals and health economics journals.

Q Okay. Do you coauthor articles?

A I do.

Q With doctors?

A With doctors, yes.

Q Epidemiologists?

A Yes.

Q Health economists?

A Yes.

Q Do you review articles written by other people?

A I do.

Q Can you explain for the record what that means?

A Well, when an academic like me writes a paper on a

particular topic and submits to it a journal, that journal will then send my paper to a variety of experts to determine whether the paper ought to be accepted, whether it ought to be published, and so I have been one of those reviewers on several occasions, probably hundreds of occasions.

Q For what publications do you serve in this role as reviewer?

A For economics journals, for health policy journals, for medical journals, all of the type that I've published in like *JAMA* and the *New England Journal of Medicine*.

Q Is that peer review, by the way?

A That's peer review, sir.

Q Are you a peer reviewer for the *New England Journal of Medicine*?

A I am.

Q Are you a peer reviewer for *JAMA*?

A I am.

Q Are you a peer reviewer for the *Annals of Internal Medicine*?

A Yes, I am.

Q You indicate in your CV -- let me see if I can find it really quickly -- that you -- I probably won't be able to -- that you hold -- you do work for the Congressional Budget Office and hold a position there, correct?

A Yes. Correct.

Q What do you do for the Congressional Budget Office?

A The Congressional Budget Office has a panel of health advisors comprising doctors, economists, other people in the industry, and we advise the Congressional Budget Office on how to score different pieces of legislation that the federal government is thinking about passing.

So just as an example, Judge Polster, if Congress is wrestling with a complicated piece of legislation like Medicare for all, it is the job of CBO to tell Congress how much that's going to cost. And that is a very difficult task, and CBO relies on its panel of health advisors to help advise it.

Q And, again, is your work for CBO on the subject of health policy?

A It is.

Q NAM, what's NAM?

A NAM is the National Academy of Medicine.

Q What is the National Academy of Medicine?

A The National Academy of Medicine is a group of individuals, you have to be elected to the NAM, so you're not automatically part of NAM. It operates under Congressional charter since I believe President Lincoln's time, and the purpose of NAM is to give Congress unbiased advice on matters that improve the nation's health.

Q Are you an elected member of NAM?

A I am.

Q When were you elected?

A Wow. I believe it was 2012, but it is on my CV, sir.

Q And do you do work for NAM in advising Congress?

A Yes. I have served on NAM committees in the past, I have provided testimony to NAM in the past. I am currently serving on a NAM committee that is trying to give Congress advice on government structures for emerging medical innovations.

Q Now, Dr. Chandra, before we move to your opinions in this case, I want to ask you about one subject, and that's the subject of epidemiologists and health economists. What's the interplay between epidemiologists and health economists?

A I can answer that question, sir, through my experience. I find myself very intertwined with the discipline of epidemiology. Epidemiology and health economics both care about health outcomes, so both disciplines spend a lot of time thinking about the measurement of health outcomes. Both disciplines spend time and concern themselves with understanding what causes health outcomes. And both disciplines are intimately involved in what kinds of public policies would improve health outcomes.

Q You're not an epidemiologist, correct?

A No, sir.

Q You are a health economist?

A Yes.

Q Does the fact that you're not an epidemiologist in addition to being a health economist limit in any respect your ability to give the opinions you're going to give today?

A No, sir.

Q Dr. Chandra, do you have the expert report that you wrote in this case in front of you?

A I do.

Q If you -- if you feel you need to refer to it, just let us know, it's perfectly appropriate. Okay?

Okay. What I want to talk to you about first is your assignment in this case, and I believe that's addressed on page -- paragraphs 8 and 9 of your report. Is that correct?

A That's correct.

Q Now, you indicate in paragraph 8 that you've been retained by counsel for CVS to determine if it would be reasonably possible to apportion abatement among the numerous actors involved in prescription opioids for the asserted nuisance in Lake County and Trumbull County.

Do you see that?

A I do.

Q Was that one part of your assignment?

A Yes, it was.

Q Did you reach an opinion as to whether it's reasonably possible to apportion abatement?

A Yes, I did.

Q And what's your opinion?

A That it is possible to reasonably apportion abatement.

Q Okay. Now, in paragraph 9, you state on the second part of your assignment, "If I determined apportionment was reasonably possible, I was asked to the extent feasible to develop a reasonable, simple, and conservative method of apportionment that the Court may apply to whatever sums, if any, it decides is appropriate to abate the nuisance."

Do you see that language?

A I do, sir.

Q Does that accurately describe your assignment in this case?

A It does.

Q Okay. I want to ask you before we move on to a more in-depth discussion about your assignment, I want to ask you a question about that language.

With regard to the language in that paragraph 9 on developing a simple methodology to the extent it was feasible to do so, who gave you that instruction?

A You did.

Q Are there other methods of allocating abatement?

A Yes, there are.

Q Are there more complicated methods of allocating abatement?

A Yes, there are.

Q Does your report concern those?

A No.

Q Is regression one of those?

A One of the more complicated methods, yes, it is.

Q Did you run your regression analysis here?

A I did not.

Q Did do you something different?

A I did.

Q Now, what I want to do before we move on is just spend some time talking about really quickly -- about what your assignment wasn't, and that's set forth in paragraph 10 of your report, correct?

A That's correct.

Q Are you offering any opinions on the scope of an abatement remedy?

A I am not, sir.

Q Are you offering any opinions on the kinds of relief that the abatement remedy may encompass?

A I am not.

Q Are you offering any opinions on the amount of funds that should be awarded for abatement?

A I am not.

Q Are you offering any opinions on whether CVS or Walmart or Walgreens are culpable?

A I am not.

Q Are you offering any opinions on whether the verdict is supported by the evidence?

A I am not.

Q Are you offering any opinions on whether the verdict is supported by the law?

A By the law, sir, you said?

Q Yes.

A I am not.

Q Are you assuming for purposes of your analysis that CVS is one of the causes of the nuisance in this case?

A I am.

Q Is that the same for Walgreens and Walmart?

A Yes, it is.

Q Are you drawing this assumption due to the verdict?

A Yes.

Q Opioids. Have you ever written on opioids?

A I have not, sir.

Q Have you taught on opioids?

A I have not.

Q Have you researched on opioids?

A I have not.

Q Are you a subject matter expert on opioids?

A I am not.

Q Are you an expert on the opioid epidemic?

A I am not.

Q Are you an expert on opioid addiction?

A No, sir.

Q Did that prevent you from forming your opinions and developing an allocation framework in this case?

A It did not.

Q Okay. Can you explain that? Can you explain how the fact that you're not a subject matter expert in opioids didn't inhibit your ability to develop a framework for allocating abatement here?

A Sir, to develop my framework I relied on my expertise as a health economist. And to fill in all the data needs, I have relied on evidence from plaintiffs' experts.

Q Are you an expert in health economics?

A I am.

Q Are you an expert in health policy?

A Yes.

Q Are you an expert in health policy research?

A Yes.

Q Did this expertise allow you to develop an allocation methodology for this case?

A Yes, it did.

Q Let's move to your opinions.

And in front of you, I believe you have a demonstrative exhibit that's roughly five pages labeled CVS-DEMO-015.

A Yes.

Q And did you and I put this together -- put this together, together?

A Yes, we did.

Q Does CVS-DEMO-015 fairly summarize at a high level the methodology or framework for allocation that you developed in this case?

A It does.

Q Is it a three-step analogy -- excuse me. Is it a three-step methodology?

A It is.

Q Could you just very briefly at a high level summarize for Judge Polster each of the three steps?

A At a high level, sir, Step 1 is to figure out the share that arises from prescription opioids as opposed to illicit opioids.

Q Step 2?

A Step 2 is that we know that a number of actors are believed to have played a role in creating the oversupply and misuse, and so in Step 2, I come up with a way to allocate shares across the different sectors.

Q And just give Judge Polster an example, you don't have

to go through all of them, some of the different sectors.

A The different sectors, well, the verdict form would certainly implicate dispensers, but you would also have manufacturers, we would also have the FDA and the DEA, and we would have prescribers in there as well.

Q And then what's Step 3?

A From Step 2 we know one of the sectors will be dispensers, and so in Step 3, I am figuring out the particular share of the pharmacy sector that we can attribute to the defendants.

Q Did you base this framework on your expertise in health economics and health policy?

A Yes, I did.

Q And was your analysis and work in this case very specifically tailored to this case?

A Yes, it was.

Q Has this methodology for allocating abatement in an opioids case been the subject of scholarly articles or peer review?

A I think this is a novel case. I think this is one of the first cases, so I'm not aware of any peer-reviewed literature on how to do this allocation.

Q Are there any elements of your analysis that have been subject to peer review literature?

A In Step 2 I rely on microeconomic theory to come up

with the shares that one might allocate to the different sectors involved in -- in creating this situation.

Q So if I understand you right, that your whole three-step approach in an opioids case is new, just as the cases are new, and as there's no peer review literature out there on it, correct?

A Correct.

Q And that's not surprising to you, correct?

A No, sir.

Q But there's elements that are subject of peer-reviewed literature and commonly accepted economic principles?

(Court Reporter interjection.)

Q There are elements of your methodology that are the subject of peer review in commonly accepted economic principles?

A That's correct.

MR. DELINSKY: Your Honor, I'm mindful of when we take a break. I can do a step now or take a break now. Whatever you wish, Your Honor.

THE COURT: This is -- I was going to suggest taking one around now, and I didn't want to interrupt the doctor's testimony.

Why don't we take our break now. Around 15 minutes, and then we'll pick up with the balance.

(Recess taken at 3:11 p.m.)

(Court resumed at 3:32 p.m.)

THE COURT: You may resume.

MR. DELINSKY: Thank you, Your Honor.

BY MR. DELINSKY:

Q Dr. Chandra, when we broke we were right about to jump into a little more of an in depth discussion about Step 1 of your allocation methodology.

Did I ask you to assume that the plaintiffs' abatement proposals encompassed both legal prescription opioids and illegal opioids, like heroin?

A You did.

Q And was that assumption that I asked you to draw what prompted you to consider and develop Step Number 1?

A It was.

Q Okay. And, again, could you just summarize for the Court what the purpose and design of Step Number 1 is?

A Right. The purpose of Step Number 1 is to say that we have a problem we're trying to abate. What share of the problem might we attribute to prescription opioids?

That share is going to have two pieces to it. One is the direct effect of prescription opioids, the other is an indirect effect.

And so I'm counting both effects when I do Step 1.

Q All right. Let's stop there.

After you determined that it was appropriate as a step of your allocation methodology to draw a differentiation between legal and illegal drugs, did you find a statistical or data basis for doing so?

A I did.

Q Where did you go to find that?

A I went to Dr. Keyes's report.

Q And did Dr. Keyes provide you with a means of differentiating between harms resulting from legal prescription opioid use and harms resulting from illegal opioid use?

A She did.

Q Okay. Now, I just want to clear up something for the record before we go any further.

You talked about direct and indirect, correct?

A I did.

Q Are those your words or Dr. Keyes' words?

A Those are Dr. Keyes' words.

Q You are not opining, am I right, correct me if I'm wrong, that it is appropriate to consider indirect effects?

A No, I am not.

Q Okay. Now, Dr. Keyes provided you with an analysis that could provide an answer to this Step 1.

What kind of data did Dr. Keyes -- the portion of Dr. Keyes' analysis that you relied on, what kind of data

was it composed of?

A She's using mortality data from Lake and Trumbull County.

Q Okay. And I just want to make sure Judge Polster understands what we're doing and understands what we're not saying.

Dr. Keyes wasn't developing a methodology to allocate abatement post verdict, correct?

A Correct.

Q She was doing other things in her report, correct?

A That's correct.

Q But this mortality analysis which differentiated between legal opioids and illegal opioids was embedded in her analysis?

A That's correct.

Q Why did you determine that mortality data was appropriate for this Step 1 differentiation?

A Several reasons.

One of which is that in my own research I have used mortality data and found it appropriate for settings like this one.

The other reason is that both Dr. Keyes and Dr. Alexander agree that mortality data is appropriate to use to figure out the share of abatement that one might want to assign to prescription opioids.

So those are two reasons.

The third reason is that with the mortality data that Dr. Keyes has, it's data from Lake and from Trumbull County, so I like that. I like the fact that she's able to measure directly the quantity that I'm interested in, she's able to get data from Lake and Trumbull.

Q And to the extent that we're working in this Step 1 analysis with data from Lake and Trumbull County, does that mean that we don't have to draw extrapolations from larger sets of data?

A That's right.

Q And that was appealing to you?

A That was appealing to me because it meant one less assumption.

Q Okay. Now, Dr. Chandra, I'm showing you paragraph 20 of this report, and you say "Data reflecting mortality rates for opioid overdoses provide a clinical basis to differentiate between prescription opioid and illicit opioid abuse. It is a reasonable measure of the degree to which harmful uses of opioids concern prescription opioids versus illicit opioids."

Do you see that language?

A I do.

Q Can you explain what you mean by a clinical basis to differentiate?

A Clinical basis in my report, I'm referring to the fact that a medical examiner in Lake and Trumbull County is the person who's differentiating between whether an opioid -- a prescription opioid or an illicit opioid caused the overdose death, so the reliance on this medical examiner is what's causing me to use the words "a clinical basis" as opposed to "a survey," where we're relying on a patient's memory --

Q Okay.

A -- or knowledge.

Q Or extrapolations from other data sets, is that another alternative to a clinical approach?

A That's correct.

Q And then you say that "This data reflecting mortality rates is a reasonable measure of the degree to which harmful uses of opioids concern prescription opioids versus illicit opioids."

What did you mean by this reasonable measure point?

A I felt like it was the best data to use for this particular part of my methodology, and by reasonable I mean it was a measure that I could explain to other health economists and defend my use of that measure.

Q And is the idea of a measure sort of the idea that the mortality data can serve as a proxy for what broader opioid-related harms are resulting from prescription opioids versus illegal opioids?

A That's correct.

Q Now, is mortality data perfect?

A No. I don't believe it's perfect.

Q Is any data set perfect?

A It really depends, sir, on what you're using the data for. But in general, I don't believe that we have a data set that is actually perfect, particularly not for this very complicated opioid matter.

Q So it's a matter of picking the best data set that you determine is fit for this purpose, correct?

A That's correct.

Q And is the mortality data that?

A That was my determination as a health economist.

Q And have you used mortality data in your own research and writings?

A Many times for exactly this reason, that measurement is difficult and mortality data is more reliable than survey data --

Q Okay.

A -- for some -- for a determination like this.

Q Now, survey data can be very useful and appropriate in other settings, correct?

A I completely agree with that.

Q Now, when it came to the actual mortality count, I believe you testified that you relied on Dr. Keyes'

analysis, correct?

A Yes, I did.

Q And I am showing you what's been marked as CVS MDL 05012. Do you recognize this document?

A I do.

Q Is this Exhibit 2 to your expert report in this case?

A It is.

Q Okay. And can you state for the record what this exhibit is?

A This is my calculation for Step 1 of the methodology.

Q Now, is it yours or is it Dr. Keyes'?

A This methodology to figure out the percent of opioid-related deaths attributable to prescription opioids is hers. This is a table in my report.

Q Okay. So does this table summarize Dr. Keyes' assessment of the mortality data?

A Yes, it does.

Q Okay. And if we look at it, let's just walk through it so Judge Polster can get his arms around it.

Line 1, I'm circling it, total number of opioid-related deaths per Dr. Keyes, correct?

A Correct.

Q And it's 68 in Lake County?

A Yes.

Q What's the number in Trumbull County?

A 89.

Q And for what year is this?

A 2019.

Q Okay. Now, the next line, I'll put an arrow next to that, is the number of opioid-related deaths directly attributable to prescription opioids per Dr. Keyes, correct?

A Correct.

Q What does that mean?

A Those numbers in the second row are directly from Dr. Keyes' report, and this is a determination made by the medical examiner in Lake and Trumbull, according to her report, that the opioid-related death was directly attributable to a prescription opioid.

Q In other words, Oxycodone was in the person's blood, that kind of thing?

A That kind of thing, but I'm not the opioid expert, which is why I relied on her report, sir.

Q Okay. So this would indicate that of the 68 overdose deaths in 2019 in Lake County, 18 were directly attributable to prescription opioids, correct?

A Yes.

Q And how many were directly attributable in Trumbull County to prescription opioids?

A 13.

Q Now, the next line says, "Number of opioid-related

deaths indirectly attributable to prescription opioids per Dr. Keyes."

Do you see that line?

A I do.

Q What do you -- what did Dr. Keyes mean, to your understanding, by "indirectly attributable to prescription opioids"?

A What she's trying to get at, sir, in row three, is the idea that some heroin users may have been on heroin because they used prescription opioids in the past.

Q Okay. And does she ascribe a particular number of persons who fall within that paragraph who overdosed and died in each county in 2019?

A Yes, she does.

Q So in Lake County, am I right that Dr. Keyes concluded that 27 of 68 overdose deaths were indirectly attributable to prescription opioids?

A That's correct.

Q And that number was 41 in Lake County?

A 41 in Trumbull County, sir.

Q Excuse me. Thank you for the correction, professor.

And then below that you ascribe percentages, correct?

A That's correct.

Q So -- and this is based on Dr. Keyes' analysis of the mortality data, right?

A That's right.

Q So 26.5 percent of the overdose deaths -- the opioid overdose deaths in Lake County in 2019 were directly attributable to prescription opioids?

A That's correct.

Q And 14.6 percent of the opioid overdose deaths in 2019 in Trumbull County were directly attributable to overdose deaths, correct?

A Correct.

Q Conversely or on the flip side, if that's right, 39.7 percent of the opioid overdose deaths were determined by Dr. Keyes to be indirectly attributable to prescription opioids, correct?

A Correct.

Q In Lake County?

A Correct.

Q And that number is 46.1 percent in Trumbull County, correct?

A Correct.

Q So the percentage of overdose deaths that Dr. Keyes determines is -- are indirectly attributable to prescription opioids exceed the overdose deaths that have been determined to be directly attributable?

A That's correct.

Q So if you total them up, in Lake County, per

Dr. Keyes' analysis, am I right that 66.2 percent of overdose deaths in 2019 in Lake County are deemed to have been directly or indirectly caused by prescription opioids?

A I agree with that.

Q And that's Dr. Keyes's analysis, right?

A Yes.

Q And likewise, in Trumbull County in 2019, 60.7 percent of opioid overdoses are directly or indirectly per Dr. Keyes attributable to prescription opioids?

A That's correct.

Q Okay. And these bottom line percentages, did you use in your framework, are you recommending to Judge Polster that he use only the directly attributable percentages or are you recommending to Judge Polster that he total the directly attributable with the indirectly attributable?

A I don't have a position on that, sir. That is for Judge Polster to decide. I wanted to illustrate for Judge Polster what -- that the methodology I've proposed allows me to bring in the deaths indirectly attributable to prescription opioids and provide a sense of what the magnitudes of those numbers would be, but the decision on whether to use them or not is his, sir.

Q For the judge, correct?

A For the judge.

Q Okay. Now, in your report you propose a certain

percentage, correct?

A Yes.

Q Which percentage is it that you propose go into Step 1?

A Well, I wanted to be conservative, so I continued to use the percent of opioid deaths indirectly attributable to prescription opioids, so I used the 66.2 percent for Lake County and the 60.7 for Trumbull County.

Q I see.

And was it part of your assignment to develop a conservative methodology?

A Yes, it was.

Q Now, this indirectly attributable piece of Dr. Keyes' analysis, does that approximate the gateway effect in a way?

A I thought it did, which is why I referred to it -- that was my summary of what she was trying to do, was she was trying to quantify the gateway effect, so I refer to it as the gateway effect.

Q Are you offering any opinions on the merits of this indirectly attributable analysis of Dr. Keyes or on the gateway effect?

A No, sir, I am not.

Q Are you offering any opinions on whether the use of prescription opioids causes heroin use?

A No, sir, I am not.

Q Have you seen any literature that suggests that they might not?

A Yes, I have.

Q And is that the Compton article that you cite in your report?

A Yes, it is the Compton article in my report.

Q But you're not providing opinions on that, correct?

A No. I cite the article, sir, to just note that I am being very conservative because Compton and his colleagues do not believe that taking a prescription opioid is either necessary or sufficient to take heroin.

MR. WEINBERGER: Objection. Move to strike any testimony regarding this issue due the fact that he is not rendering an expert opinion.

THE COURT: No, I'm not going to strike it. He's explaining why he included the article, so it's important that he testify to that.

BY MR. DELINSKY:

Q So you included these indirectly attributable numbers not in an endorsement of them, but rather to be conservative?

A Yes, sir.

Q Let's move on to Step 2, and can you describe again what you endeavored to do in Step 2.

A In Step 2 I have to apportion those two numbers, that

66.2 percent and the 60.7 percent, across the various sectors that may have played a role in the pollution that we're here to abate.

Q Do you identify those sectors in your report?

A I do.

Q And what are they?

A I identified five sectors.

The first sector I'm going to call manufacturers.

The second sector is the federal government, comprising the FDA and the DEA.

My third sector is prescribers.

Q And what do you mean by prescribers?

A Well, I was thinking the people who are able to write prescriptions for prescription opioids.

Q And the people who do write them?

A And the people who do write them.

Q The prescribers capture the healthcare providers who wrote the prescriptions that CVS, Walgreens, and Walmart filled?

A Yes.

Q All right, keep going.

A My fourth sector were the pharmacies.

And my fifth sector were diverters.

Q Okay. What did you rely on to identify this body of actors, given that you are not an expert in the opioid

epidemic or in opioids generally?

A I relied on three sources, sir.

I relied on statements and evidence from plaintiffs' experts.

I relied on the complaint and the complaints themselves.

And I also relied on the verdict form.

Q Okay. Let's take these in turn.

What did the verdict form tell you?

A The verdict form -- and if you don't mind, am I allowed to look at my report, sir?

Q You are. And I can also put the verdict form up if that would be helpful to you.

A Well, the verdict form to me says that the asserted nuisance is, quote, "The oversupply of legal prescription opioids and diversion of those opioids into the illicit market outside an appropriate medical channel." So when I saw the word diversion, I thought it was important to introduce the role of diverters.

Q Okay.

A I also found evidence from plaintiffs' experts that diversion, medicine cabinet diversion, for example, was a real phenomenon.

Q Okay. And pharmacies, what was the main -- well, let's just cut through it. Was the verdict against CVS,

Walgreens, and Walmart the primary basis for including pharmacies in your list?

A Yes. That's it, sir.

Q Did plaintiffs' experts also talk about pharmacies as a cause?

A Yes, they did.

Q You talk about plaintiffs' complaints. Which -- what are you talking about when you say that?

A Well, the original complaint, sir, lists -- it's the original complaint that starts with Purdue Pharma, and it lists -- it has a very long list of manufacturers and distributors named in it. So I used that complaint to identify the role of manufacturers.

Q Let's just pause here for a minute. Call tab 11 and 12.

Dr. Chandra, you're going to be handed two exhibits. One is Defendant DEF MDL 11897 and one is Defendant MDL 11897. And I'm putting the cover page to 11897, the cover page to the complaint itself, up on the screen.

Are these the complaints you're referencing?

A Yes, they are.

Q Focusing on Defendant MDL 11897, who filed this complaint?

A If you're looking at -- sorry, sir. Are you on 187 -- on 897 or 899?

Q I'm on 118997, I believe is the exhibit?

A I believe that this is the complaint that is being filed by Lake County.

Q And who does Lake County file this complaint against? Was it manufacturers, you said?

A Yes.

Q Okay. And does this complaint contain statements that you considered about the culpability of manufacturers in creating a public nuisance in Lake County?

A It does.

Q Now I'm putting up on the ELMO the Trumbull County version of this, Defendant MDL 11897.

Is this the version of the complaint filed by Trumbull County that you reviewed?

A It is.

Q Did Trumbull County file it?

A They did.

Q Is this complaint filed by Trumbull County against manufacturers?

A It is.

Q Does it contain statements about the culpability of manufacturers and causing a public nuisance in Trumbull County?

A Yes, it does.

Q Did you consider those statements?

A I did.

Q Lastly, you cite as a source for how you identified these many causes, plaintiffs' experts. What did you mean by that?

A Well, plaintiffs' experts, sir, like Dr. Keyes and Dr. Alexander, testified that the FDA and the DEA played a gatekeeping role in the vertical supply chain, and so it was because these medicines were approved or because their distribution was not sufficiently regulated that we had a portion of the pollution that we're here to abate.

Q I'm showing you just an excerpt from the trial testimony of -- you can see right up there, this is Mr. Lanier, who-you're-going-to-talk-to-soon's examination of Dr. Alexander.

Is this -- if you can take a look at this, is this testimony that you reviewed?

A Yes, it is.

Q And is this testimony that you considered in identifying the actors to go into Step 2 of your analysis?

A Yes.

Q And you see here that Dr. Alexander is asked, "Many, many causes, right?

"Yes."

Do you see that?

A Yes.

Q Did you consider that?

A Yes.

Q He's asked "Manufacturers?" And what does he say?

A The answer is affirmative, he says "Yes."

Q It's one of the many causes, right?

A Yes.

Q We'll skip around.

He's asked "Doctors?"

And what does Dr. Alexander say?

A He says "Yes" to that.

Q Doctors are one of the many causes.

He says drug cartels, right?

A Yes.

Q What does Dr. Alexander say when asked about drug cartels?

A He says that they are also a cause.

Q FDA?

A He says that they're a cause as well.

Q DEA?

A Yes.

Q People who keep opioids available for high school kids to take to a party?

A Yes.

Q Dr. Alexander says they're one of the causes?

A He does, yes.

Q Pharmacists?

A Yes, he includes them.

Q Okay. And does he say -- does he limit that to CVS, Walgreens, and Walmart?

A No, he doesn't. He doesn't draw that distinction.

Q "Pharmacies that set policy and give the pharmacist tools?"

A That's correct.

Q Did Dr. Alexander say pharmacies are a cause too?

A He did.

Q Is this the kind of testimony from plaintiffs' experts that you relied on to identify these other causes?

A Yes, very much so.

Q Are there -- were there many other excerpts from their trial testimony from both Dr. Keyes and Dr. Alexander that you relied on as well for these same points?

A I did. And I cited each one of the occasions when I used their testimony in my report.

Q All right. So now we've identified the actors.

How did you go about apportioning shares or allocating shares of abatement among these five sectors?

A I used an idea that comes from microeconomic theory, that was introduced to economists by an economist named Lloyd Shapley, who went on to win the Nobel Prize, and it's a way to apportion shares when you have multiple causation,

when you have multiple actors or entities responsible for creating some outcome.

Q What's the outcome you identified here?

A The misuse of a pill.

Q Okay. And you describe it in your report as links in a chain, correct?

A Yes.

Q What did you mean by that?

A I was thinking that we're in a world where we've got multiple actors, and I'm thinking in part of these five actors that are links in a chain, and all five of these actors have to be present for a pill to be misused.

Q I'm sorry to interrupt. Keep going, Dr. Chandra.

Okay. So if I have this right, a pill can't get to misuse unless the FDA approves it, right?

A That's right.

Q And once the FDA approves it, a pill can't get to misuse if a manufacturer isn't making it?

A That's right.

Q And a pill can't get to misuse if a doctor doesn't prescribe it?

A That's right.

Q If a pharmacy doesn't fill it?

A Correct.

Q And then if at the end of the day someone doesn't

divert it?

A Correct.

Q Was that your analysis?

A That was the analysis.

Q So given that analysis in this microeconomic principle that you've talked about, did you affix percentages to each link in the chain or each one of the actors?

A Yes. Shapley says that if one believes that the actors are all equally responsible or have been found to be equally responsible, then all one has to do is to divide the amount by the number of actors.

Q Now, are you opining that a pharmacy's equally responsible to a Purdue Pharma?

A No, sir. This is not a way of actually determining culpability.

Q Okay. Is another way to look at this that -- that Shapley's value speaks about simultaneous action?

A Yes.

Q And when Shapley's action speaks about simultaneous action, how are each of the simultaneous actors are -- do they get equal shares?

A They all get equal shares if it's simultaneous.

Q Did you use the simultaneous model here?

A Yes.

Q So what share did you give to manufacturers?

A 20 percent.

Q What share to the federal government?

A 20 percent.

Q What share to prescribers?

A 20 percent.

Q Pharmacies?

A 20 percent.

Q Diverters?

A 20 percent.

Q And that's a simultaneous application of Shapley's?

A Yes.

Q That's the microeconomic principal to which you referred in your report?

A Yes.

Q And you testified a lot about Shapley's value in your deposition, correct?

A Yes.

Q Look, I've just got to ask you the most obvious question. That seems really simple. Now, I asked you for simple, but putting aside that, that seems simple, maybe it could be critiqued for being overly simple. What's your response for that?

A I'm describing the use or the application of Shapley based on the evidence that I have in front of me. There are more complicated applications of Shapley that require

additional assumptions that I did not have based on my reading of plaintiffs' experts or the complaints or the verdict forms, so I did the conservative thing and assumed that these five actors are all essential, they're all links in a chain. If any one of them is missing, the misuse doesn't happen. And so it's a -- it is straightforward, but it's a place where being straightforward and intuitive lines up with microeconomic theory.

But to be clear, counsel, there are more sophisticated applications of Shapley that I did not consider because I did not have the evidence and it would also lower pharmacies share and CVS's share.

Q Okay. Let's stop there and let's play this out a little bit.

Is one of the more complicated applications of Shapley something called the sequential application of Shapley?

A It is.

Q Is that an application that might apply when there's sequential actions?

A Yes.

Q Might that model apply here?

A It very well could.

Q Ulnar the sequential method of Shapley might you have different percentages rather than equal percentages up and down the chain?

A Yes. You would you would have larger percentages for actors who moved first and lower percentages for actors who moved later.

Q To apply the sequential method of Shapley would that require you to make assumptions?

(Court Reporter interjection.)

Q So apply the sequential method would that require you to make assumptions?

A Yes, it would.

Q Did it seem simpler not to choose a method that did not require assumptions?

A Yes.

Q And if you applied the sequential method, do you believe it would increase or decrease the ultimate share of CVS, Walgreens, and Walmart?

A I thought it would decrease their share.

Q Why is that?

A Well, in the sequential method, sir, we're assigning a larger share to upstream actors. The upstream actors would be actors like manufacturers, and manufacturers in the sequential application would be held responsible for the pollution that they caused and the fact that their pollution enabled other actors to also pollute, also participate in the misuse.

Q Let's move to Step 3, okay?

Can you summarize again what Step 3 of your methodology is?

A Step 3 of the methodology is to take the 20 percent that I ascribed to pharmacies and then ask what share of that 20 percent that I allocated to pharmacies can be apportioned to the defendants.

Q Okay. What source did you use to arrive at this allocation within the pharmacy sector?

A I relied on the OARRS data, sir.

Q Now, did you prepare a table to this effect that appears in your report?

A I did.

Q Okay. Could you please look -- it's been handed to you, it's CVS MDL 0503 -- do you have that exhibit?

A I do.

Q Dr. Chandra, is this the exhibit you just discussed that appeared in your report?

A Yes.

Q Okay. And what does this exhibit show?

A This exhibit shows what the shares of different pharmacies is using six different definitions.

Q Okay. And for each of the six definitions, did you actually supply the information underneath them?

A Yes.

Q Okay. So what are the six definitions?

A The first three definitions are just what share of total prescriptions are accounted for -- total prescriptions that were dispensed for opioids by CVS in the OARRS.

The second column is the share of total MMEs, so I scaled every pill to its MME count.

The third is the share of dosage unit, so capsules.

And then as you know, sir, plaintiffs' expert Carmen Catizone and Craig McCann also created these red flags. They didn't say that every dispensed opioid prescription was a warning sign, so I then went and created the red flag opioid prescription in the OARRSs and repeat columns 1, 2, and 3 with the red flag opioids that I was able to create in the OARRS data.

Q So if you take the six slides of CVS, just so Judge Polster can understand this, this isn't a percentage of CVS's own dispensing, it's the percentage that CVS represents within the entire market in Lake and Trumbull counties, correct?

A That's correct.

Q Because the OARRS information attains information on all community pharmacies in these two counties, is that right?

A That's right.

Q And what were the years of the OARRS data?

A For this analysis, sir, I used 2008 to 2018.

Q And when it came to the red flag analysis, were you capable of recreating and running the red flags, all of the red flags through the OARRS data?

A I was not, sir. As you know from Mr. McCann's report, he has 16 red flags, and in the OARRS data I am able to replicate 13 of the 16.

Q And is that because the OARRS data doesn't have all the fields that's needed for the remaining three red flags?

A That's exactly right.

Q And in this Exhibit 3A you provide percentages for CVS, correct?

A Correct.

Q Walmart, correct?

A Correct.

Q Walgreens, correct?

You include them for Rite Aid, correct?

A Yes.

Q And did Mr. Catizone opine that Rite Aid's dispensing was improper?

A He did.

Q Did you include percentages for Giant Eagle?

A I did.

Q And did Mr. Catizone opine that Giant Eagle's dispensing was improper?

A He did.

Q And did you include percentages for all other pharmacies in Lake and Trumbull County that are represented in the OARRS data?

A I did.

Q Now, the chart we're looking at, CVS MDL 05013, concerns Lake County, correct?

A Yes.

Q Did you create a comparable chart for Trumbull County?

A I did.

Q Is that CVS MDL 0504?

A Yes, it is.

THE COURT: It's 05014.

MR. DELINSKY: Thank you, Your Honor.

THE COURT: The other one was 05013.

MR. DELINSKY: Thank you, Your Honor.

BY MR. DELINSKY:

Q And does the Trumbull County version of this Exhibit 3B to your report contain the same information for Trumbull County that Exhibit 3A contained for Lake County?

A Yes, it does.

Q Now, in your report you propose a particular column for use in filling out the methodology, correct?

A Correct.

Q Which column is that?

A I chose column five.

Q And that's red flag prescriptions as measured by total MME, correct?

A Yes.

Q Could Judge Polster pick from any one of these columns?

A Absolutely.

Q Is that the one that you thought was most useful?

A Yes.

Q Okay. So let's just break these out and just fill out our chart.

So that means -- well, that means in Lake County -- let me just make sure I had it right -- within the pharmacy market, CVS has 21.4 percent red flag MMEs, right?

A Yes.

Q Walmart, 8.1 percent, is that right?

A Correct.

Q Walgreens, 21.3 percent?

A Yes.

Q Okay. And then if we were to go to Trumbull, CVS, 5.4 percent?

A Yes.

Q Walmart, 1.6 percent?

A Yes.

Q Walgreens, 16.4 percent, is that right?

A Correct.

Q Okay. Let's go back to the demonstrative exhibits, and I'm putting up on the screen CVS-DEMO-017. It's the slides, Dr. Chandra, and they may have gotten lost in the shuffle there.

No, I'm sorry, 016.

A Okay.

Q You have it, okay.

Does this slide explain how one can go about applying the methodology?

A It does.

Q And could you walk Judge Polster through it?

A Yes.

So the Step 1 numbers, Judge Polster, you will recognize is the numbers that I got from the portion of my report where I count the direct and indirect effects of prescription opioids. Those two numbers in row one are in Dr. Keyes' report.

Step 2 is where I apply Shapley to a world where there are five actors, all essential, all acting simultaneously, and in that world Shapley says five actors, divide by five, because each one is equally important.

In Step 3, what I do is I look at the OARRS data to look at the market shares for the three different defendants.

Q So to put them all together, we multiply -- we take

20 percent -- let's look at Lake County.

We take 20 percent of 66.2 percent, correct?

A That's correct.

Q And that defines the pharmacy sector share of the prescription opioid share, right?

A Yes, that's correct.

Q And then once we get that number, we multiply it by -- to get -- let's use CVS. We multiply it by CVS's share of the pharmacy market, correct?

A That's correct.

Q And that ends up with -- that gives us the ultimate shares of allocation, correct?

A That's correct.

Q So using this method, CVS's share is 2.83 percent for Lake County, correct?

A Correct.

Q And .66 percent for Trumbull County?

A Yes.

Q Walgreens' share of abatement is 2.82 percent for Lake County, correct?

A Correct.

Q And 1.99 percent for Trumbull County?

A Correct.

Q Walmart's share of abatement using this method is 1.07 percent of Lake County?

A Correct.

Q And .19 percent of Trumbull County?

A That's correct.

Q And is the idea that once you have these percentages, you just multiply that percentage by the sum set by Judge Polster for abatement to get your -- the number?

A That's exactly right.

Q I think we're just about done. I just want to talk about one other concept, Dr. Chandra, and that is what if Judge Polster were to say, you know, I don't think FDA and DEA should have a share and I don't think diverters should have a share, okay? Even though you've ascribed it to five, Judge Polster says it should only be three. Will your model accommodate that?

A Yes, it will.

Q Okay. I'm showing you a CVS-DEMO-018.

Does this demonstrative explain how your model would accommodate it?

A It does.

Q And am I right that in short, Step 2, if there's only three actors instead of five, the pharmacy share goes up to 33.3 percent?

A That's right.

Q Okay. And that would result in a corresponding increase to the shares for each of the pharmacy defendants?

A That's correct.

Q Okay. Now, what if Judge Polster were to say three's too many and, you know, obviously the doctors wrote all the prescriptions so they got to be on the hook, and then you've got the pharmacy, so I'm just going to do two, okay? Would your model accommodate that?

A It would.

Q Okay. And I'm showing you CVS-DEMO-019. Does this indicate how your model could accommodate that?

A Yes, it does.

Q And is sort of the shorthand version that Step 2, where it was originally 20 percent to the pharmacy sector, now it's 50 percent?

A That's correct.

Q And is the net result of that that the shares of CVS, Walgreens, and Walmart increase yet again?

A Yes, that's correct.

MR. DELINSKY: Professor Chandra, thank you.

Doctor -- Judge Polster, Juris Doctor Polster, I pass the witness.

MR. LANIER: May it please the Court:

CROSS-EXAMINATION OF AMITABH CHANDRA

BY MR. LANIER:

Q Dr. Chandra, my name is Mark Lanier. We've not had the pleasure of meeting. I'm going to cross-examine you,

sir. I'll try to be as quick as I can, but brevity is a two-way street. I need you to listen carefully to my questions and I want full honest answers, but try to answer the question directly. Is that fair?

A Fair, sir.

Q All right. I've divided my questions of you into three different stops along the road of your cross-examination. I want to talk to you about what I call prereq's, then application, and then concerns.

You with me?

A I'm with you, sir.

Q All right. Prereq's, you're a college professor, right?

A I am a professor at Harvard University, sir.

Q Okay. Well, university professor, I didn't mean to insult you.

You ever thought about being a guest lecturer at Texas Tech University?

A I would be honored, sir.

Q Darn right you would.

You got asked a question, but I'm going to phrase it in terms of prereq's because there are certain classes that you take in college where before you take the class you have to take the prerequisites, right?

A Yes, sir.

Q So you're familiar with this term of prereq's, prerequisites, right?

A I am.

Q Now, I'd like to focus then on whether or not you have the necessary prerequisites to do what you have done in this case, all right?

In that regard, you have testified to his Honor that you've studied the high cost of healthcare, medical malpractice, quality of healthcare, adverse effects of high deductible plans, but you've never really referenced opioids as a study area before your expert testimony you've been paid to do in this case, right?

A That's exactly right, sir.

Q You were asked, do you teach epidemiology students?

A Yes.

Q You said yes, if they take my class, right?

A Correct.

Q I'm a Hebrew major, I have a degree in Hebrew. If I had taken your class you could have said you teach Hebrew students, right?

A I could have, sir.

Q But that doesn't make you a Hebrew teacher, does it?

A No.

Q I mean, heavens, if epidemiology students take a theater class, then the theater professor can say, yes, I

teach them, but you're not teaching them epidemiology, are you?

A No, sir. I'm not teaching them epidemiology.

Q Thank you.

Now, when I look then at your CV, which has been presented to us and you have testified about, it's a great CV. It's got some great things and you're doing wonderful things, and I compliment you on all of that; but I can't find the word "opioid" anywhere on it.

A I have not written on opioids, sir.

Q You have not taught on opioids, have you?

A I have not.

Q You have not taught on the epidemic, right?

A That's correct.

Q You have not taught on the responsibility of prescribers, right?

A I have not.

Q Such that you're opining what their responsibility might be under your -- well, it's game theory model that you're using, right?

A Yes.

Q Yeah. So you have opined under game theory of what their exposure might be, but you have never taught on the responsibility of prescribers, right?

A I have not, sir.

Q In fact, on page 48 of your deposition, if I recall correctly, you did not even know what the CSA, the Controlled Substances Act was, correct?

A Yes. I believe Mr. Sal --

Q Sal is his first name, this fella right here.

A I remember that moment, sir, right.

Q We got to get his name right on the record. He's going to show it to his kids.

And then in this regard, you were asked by my friend, Mr. Delinsky, "Can you explain how the fact that you're not a subject matter expert in opioids didn't inhibit your ability to develop a framework for allocating abatement?"

Do you remember that question?

A Yes.

Q And your answer was, "To develop my framework, I relied on my expertise as a health economist, and to fill in all the data needs, I've relied on evidence from plaintiffs' experts."

Do you see that?

A Yes, sir.

Q And I looked at your Appendix B, your materials relied upon, and it's got some expert reports, and it's got some deposition and testimony.

A Yes.

Q But, sir, I don't see anywhere that it indicates that

you looked at the expert report of Dr. Anna Lembke, did you?
A I did not, sir.
Q The Stanford addiction specialist who testified about what responsibilities different people had and different entities had, you didn't look at that to fill in your data needs, did you?
A No, sir.
Q You didn't read her testimony in the trial or in any of the depositions she gave, did you?
A No, sir.
Q You did not read the deposition of Joe Rannazzisi, FDA -- not FDA, the DEA gentleman in charge of investigating a number of different behavioral issues including some pharmacy issues in this case. You didn't read his deposition, did you?
A No, sir.
Q You didn't read his trial testimony, did you?
A I did not.
Q So when you say that you relied on evidence from plaintiffs' experts, even that's a very narrow set of experts that you relied upon, fair?
A I don't know all these other experts, sir.
Q Exactly.
So your scope of vision, your field of vision is one that's been defined for you by what you've seen, right? The

prereq that you would need of opioid knowledge to assign responsibility to opioid sectors has been supplied, albeit very limitedly, true?

A I don't know, sir, because I've not read those other experts, so I would need to know -- read these other excerpts and then I may agree with you, but right now I have not read them, so I don't know.

Q Exactly my point.

A So I agree, I've not read them.

Q So you haven't relied on them, that's a gimme?

A Yes. I've not relied on them.

Q So instead of answering the question as you did, I have relied on evidence from plaintiffs' experts to fill your data needs, you could maybe more accurately say I've relied on evidence from a few of plaintiffs' experts, fair?

A Yes. I could -- and the ones I've relied on, as you noted, sir, are the ones that I note in Appendix B. That's fair.

Q Great. Now, in executing your assignment, according to your report, paragraph 12, you said I have relied on my own research and experience; is that correct?

A That's correct, sir.

Q I've had a chance to look at your bills for Analysis Group, the group you work under. Have you seen your bills?

A I saw them at my deposition, sir. I have not seen

them since, and that was the first time I saw them.

Q Would you be shocked to find out that if you look at all the Analysis Group work that you've done for opioids associated with you, that the hours you've spent have been 74.5 hours, while the total hours of Analysis Group have been 4,423 hours?

A I didn't -- I'm not surprised with the first column, sir, because those are my hours. I don't know anything about the second column, as in I didn't submit those hours.

Q All right. So when you say you've relied on your own research and experience, you didn't rely on anybody else with Analysis Group for any of their work?

A No, I did. But I didn't submit their hours is what I'm saying, sir.

Q Well, my complaint is not who submitted the hours, my complaint is your comment that you've relied on your own research when in fact seven times as much research and work was done by other people than you. You follow me?

MR. LANIER: Actually it would be six, Judge, my math just failed me.

BY MR. LANIER:

Q Six times?

A I did rely on my own research, and my team and Analysis Group was helping me --

THE COURT: Might be 600.

MR. LANIER: Oh.

THE COURT: If it's really 4,000 hours from --

MR. LANIER: 4,423, it's 6-0 -- I dropped a decimal, Judge. 60 times.

THE COURT: Right.

BY MR. LANIER:

Q I'm just saying in the interest of full disclosure to his Honor when you're sitting here swearing about this stuff, isn't it more accurate to say that I've relied on my research and experience, as well as 60 times as much work in terms of hours at least by other people who were getting paid to do this with me?

A Yes, sir. A lot of this research, a lot of the numbers in this report are numbers that require a lot of data cleaning, as you know, because we're relying on OARRS data, and that is what the team and Analysis Group was involved in.

Q Okay. Now we've got your prereq's out of the way, we understand the limits of your opioid knowledge and where you're getting your information from, and how much you've had to rely on other people.

Now I'd like to look at how that applies to your testimony, okay?

A Okay.

Q Let's take your expert report and let's look at it

with his Honor, and I'll represent to you the odds are really good the judge read this before we even got here today, okay?

A Okay.

Q So I'm going to be going through this fairly quickly. You talked about how you've testified before the U.S. Senate and others, then a consultant to RAND and others. Remember that testimony?

A Yes.

Q None of that is opioid, though, right?

A Correct.

Q And then you continue to talk about what you did in this case, and Step 1 is differentiating prescription opioids from illicit opioids, right?

A Right.

Q And this is where you start calling Katherine Keyes someone who had, quote, her gateway theory, and you put gateway theory in quotation marks. Remember that?

A I did.

Q And you call it her gateway theory, you see that as well?

A Yes.

Q So you never had the benefit of Dr. Lembke's book, which was cross-examined basis by Mr. Majoras during the stage one part of this trial, where she uses the phrase

gateway, and talked about how common it was for this phenomena. You didn't have the chance to read that, did you?

A I didn't read it.

Q So her gateway theory is if this belongs to some exclusive right of Katherine Keyes, Dr. Keyes, as if she made this up at Columbia, you understand that's not the case, right?

A I don't think she made it up at Columbia, sir. I used the numbers from her in my report.

Q Well -- but you continually persist in doing this, "Accepting Dr. Keyes' computations for purposes of this report only, and without endorsing or accepting her, quote, gateway, close quote, theory and her method of computing it, I" -- and you go on to say what you did.

Do you see that?

A Yes, sir.

Q And then in paragraph 22 you say that the epidemiologist, the use of these numbers leads to an estimate that overstates the portion of abatement that should be allocated to prescription opioid use.

Correct?

A Correct.

Q And, again, you're basing that on the knowledge and gaps being filled in by some of the plaintiffs' experts,

right?

A That's right.

Q Because you've got no basis for saying that on your own, true?

A Yes. I rely on experts like Dr. Caleb Alexander, who worries about survey data overstating heroin use, for example, but it is true that I am relying very much on Dr. Alexander for that statement.

Q Because you didn't go back and research those papers and read the Midgette paper, which by the way a RAND report, or things of that nature, did you?

A I did not.

Q When you put sentences in here like paragraph 25, "Using principles of microeconomic theory, I'm able to apportion among these five sets of actors" -- do you see that?

A Yes, sir.

Q -- what you're actually using here is game theory, aren't you?

A I'm using cooperative game theory, that's correct, sir.

Q And game theory is not synonymous with microeconomic theory, although they have an intersection if we were to put them into a Venn diagram. Fair?

A It's a subset of microeconomic theory, sir.

Q But it exists outside of microeconomic theory as well, right?

A In other disciplines. In economics it comes under microeconomic theory.

Q You know what a Venn diagram is, right?

A I do.

Q So game theory exists in other disciplines, but there are places where it intersects with microeconomics, right?

A Right. But the application of Shapley comes from microeconomic theory, sir.

Q Well, we're going to talk about that in just a moment. We'll pull the report up.

Actually, not his 1951-whatever bell curve, but we will pull up the usage of his material. All right?

"Using principles of microeconomic theory, I'm able to apportion these five sets of actors."

Now, at the end of this paragraph you make this statement that I wanted to emphasize.

"This analysis does not account for other actors to whom a percentage could be apportioned, nor do I attempt to draw distinctions in culpability amongst the numerous actors and instead assume for purposes of simplicity equal shares."

Do you see that?

A Yes.

Q Do you understand the importance of accuracy over

simplicity?

A I do.

Q And you opted for simplicity over accuracy, didn't you?

A For the -- with the information I had, sir, I felt like I only had information to assume equal shares. Somebody else with more information might be able to apportion differently than I have.

Q Exactly. Because you didn't have the data, you don't have the prereq's to be more accurate, so you went for simple, didn't you?

A The experts I relied on did not draw distinctions between the relative roles of the FDA, manufacturers, prescriptions -- prescribers. They would often say that they were involved, they were important, they were essential, but they didn't say that this person was more essential than this other person, so I said why don't I just do the conservative thing and assume that they're all equally essential.

I thought that that was being conservative, sir, because I'm assuming that the FDA -- I'm assuming that manufacturers are as much -- as culpable as pharmacies are.

Q Yeah, but you see that's why I'm challenging you on this as we go along here in a moment. But the application that you've done here is just based on what you've learned

for your prereq's, right?

A From plaintiffs' experts, sir, yes.

Q From some of plaintiffs' experts.

A Okay.

Q So, for example, if the jury heard testimony about how in 1996 Walmart was cooperating with manufacturers to disseminate information about OxyContin, and if you heard about the other pharmacies working with the manufacturers to do things, you wouldn't have that data to take into account, would you?

MR. MAJORAS: Objection. Misstates evidence from trial.

MR. LANIER: Your Honor, I would reference the Court to Plaintiffs' Exhibit 16750, which is the 1996 medical education dinner that was done with both parties, Walmart and -- I've got the exhibits from the trial, Judge.

MR. MAJORAS: I don't deny the exhibit, Your Honor. I deny his characterization that says there's collaboration among manufacturers and Walmart.

MR. LANIER: I'll ask it a different way, Your Honor.

THE COURT: Rephrase that.

I'll sustain the objection.

MR. LANIER: I'll ask it a different way.

BY MR. LANIER:

Q You don't have any knowledge about the 1996 work between Walmart's pain management symposium, where they brought in speakers from Purdue and worked with Purdue to make this presentation to tell doctors and others about the use of OxyContin in the treatment of pain?

MR. MAJORAS: Same objection.

THE COURT: Well, I think we can save some time, Mr. Lanier. The doctor has said he has no prior knowledge of opioids, didn't do any research, never has written on it. All he has is the few expert reports that he read. That's it.

MR. LANIER: That's it.

BY MR. LANIER:

Q So if the other -- if this other world exists out there with additional data, you didn't take it into account, fair?

A Fair.

MR. LANIER: Thank you, Judge. That was quicker.

BY MR. LANIER:

Q When you start detailing who these actors are, you never reference the fact that the pharmacies were deemed the, quote, last line of defense, did you?

A No, sir, because I felt like that was being very conservative. If I had brought that in, I would have put

the pharmacies at the very end of the sequential ordering, and that would give them an even smaller share than what I have.

Q Under game theory?

A Under the sequential application of Shapley, sir.

Q Which is game theory?

A Which is cooperative game theory.

Q Yes, sir. In other words, if you use game theory to try to assess culpability and responsibility, then it's not a question of who was most heinous in their actions or who had the broadest reach, it's just a question of who was the last one in terms of deminimizing responsibility. Is that right?

A I don't know what that means, sir. You'll have to restate that question.

Q That's fair. I'll break it apart here in a minute.

Let's do it this way.

I'll do it when I get to the concerns stop, but I need one more set of application set of questions, and then we'll get to the concerns, and we'll be done. All right?

A Okay, sir.

Q First of all, I looked at your chart, I tried to reproduce it here, but I actually did this off the testimony of Dr. Keyes while she was on the stand.

Look at it and see if I got the numbers right the way

you did them as well.

With Dr. Keyes, Lake, 97 deaths that were direct, indirect 135, not attributed to transition, 118. Are those consistent with your numbers?

A Sir, I don't know where these numbers you have are coming from. I verified that the numbers in my Exhibit 2 are directly from her report, so I don't dispute -- I mean, I just don't know where these numbers you have are from, sir.

Q Well, they're from her testimony in this trial that was written on boards by the lawyer for Walgreens as to the direct, indirect, or not attributed to transition numbers. Those are different numbers than you have, aren't they?

A Yes, they are. I don't know where the numbers you have came from, sir.

Q They came from Dr. Keyes, but you selected only 2019 data, didn't you?

A That's right.

Q That was a choice you made instead of looking at a more expanded group of data, right?

A Right.

Q And so you chose 2019 when I was -- now, was that you or some of the people in the Analysis Group that chose that?

A That was my decision, sir, because of the assignment I was given.

Q In the process of understanding those three categories, at least the categories that were used in this courtroom are consistent with the three categories that you cite for Dr. Keyes, correct?

MR. HALL: Your Honor, I'm going to object because Mr. Lanier's third category there does not correspond to what Dr. Keyes testified to or what the board --

THE COURT: I don't even know where it's from, so --

MR. HALL: He's --

THE COURT: I'll sustain the objection.

MR. LANIER: Your Honor, just so the record's clear, this document that I'm using on the ELMO right now has been marked and used in this case as a demonstrative, it was used with Katherine Keyes, but I've got the testimony right here.

MR. HALL: We have her board right there, we can look at it.

MR. LANIER: We will use the testimony. This was my demonstrative.

BY MR. LANIER:

Q Now, page 196, starting at line 18, or line 20, you were asked in one of the charts done by the Walgreens attorneys, "You listed for Lake 97 deaths in this cumulative

five-year analysis."

Remember that?

A Yes.

Q Are you tracking with me?

A Yes.

Q So this is five-year analysis, not one-year analysis like you're using, right?

A Right.

Q "Those 97 were direct for Lake, 94 direct for Trumbull."

Do you see that as well, sir?

A Yes, I do.

Q And those, again, are the categories that you used, you used direct as one of your three categories, right?

A Right.

Q The testimony continues.

"You also had 135 for Lake that were indirect, true? 189 for Trumbull indirect."

"Yes."

Do you see that as well?

A Yes.

Q So now we've got the direct category that you used, the indirect category that you used, but then there was a third category you disregarded as having nothing to do with these defendants, correct?

A I don't even know what the third category is, sir.

Q Look at your chart that you were testifying about a few minutes ago.

THE COURT: Well, I assume, Doctor, that the third category was that the remaining deaths that you didn't determine were either directly or indirectly caused by prescription opioids, right?

THE WITNESS: Yes, sir. Judge Polster, I'm just confused. I don't even disagree with Mr. Lanier, I'm just confused about the third category and what is in there. So what you said makes sense, but I don't know if that's what's in the third category.

BY MR. LANIER:

Q That was your third category, is what the judge just said. In other words, you divided up into three categories -- --

THE COURT: He didn't list the third category, it's just the remainder. So if you've got 66.2 in categories one and two, you've got 33.8 that are then deaths not directly or indirectly attributed to opioids, right?

MR. LANIER: Exactly. Thank you, Judge.

THE COURT: Doctor, is that correct?

THE WITNESS: That's correct, sir. Judge Polster, in my Exhibit 2, if you total the direct and indirect of prescription opioids you get 66 and 60 percent,

which means in Lake County that illicit drugs like heroin are responsible for 34 percent in Lake and about 40 percent in Trumbull.

BY MR. LANIER:

Q Thank you. And it's that third category, that remainder category --

A Yes.

Q -- where I questioned her and said, "You said a phrase I want you to elucidate on the record.

"Those that were not attributed to prescription opioids, you said something about to the transition were 118 and 163.

"That 'to the transition' that you added there, explain what you meant."

Do you see where I'm about to read her explanation?

A Yes.

Q She said, "I was estimating the proportion of those deaths that were attributed to people transitioning from prescription opioids to nonprescription opioids.

"So that analysis was just limited to that one pathway, but, of course, there could be other pathways more broadly linking the oversupply of prescription opioids in Lake and Trumbull County to these deaths. It just wasn't captured in that particular, you know, people start with prescription opioids and then transition to heroin pathway."

Then I asked, "I was going to ask a leading question, but," I said, "I'll have you put it in your own words."

And she said, "So as I wrote in my report" -- this is the remaining numbers -- "as I wrote in my report and I think we talked about earlier, when you have the concept of synergy in epidemiology, you know, we think about these types of environmental transitions all the time where, for example, you have prescription opioid oversupply in a particular community. That renders people in that community more vulnerable to Opioid Use Disorder.

"Now you've got a bunch of people with new Opioid Use Disorder in your community and that provides a market for illicit drug sales, for example, from drug dealers, because now you have people who are more primed to transition from prescription opioids to heroin use. And, in fact, that's what we saw in a lot of places in this country."

And she ended it with this, "So once kind of you have this opioid-rich environment, it is fertile soil for a broader array of harms to the community that may unfold over years."

Do you see that, sir?

A I do.

Q And so if in fact Dr. Keyes is also of the opinion that even that third column of remainders have a synergistic application from the oversupply of prescription opioids,

that changes your numbers tremendously, doesn't it?

A It does not, sir. Everybody in the third column is everybody who's dead. They died of -- they died of heroin.

Q I understand, but you use that and extrapolate it to the people still alive, don't you?

A I'm just using -- I'm just using the 66 and the 60 percent to give me an estimate of how -- or what the role of prescription opioids was in Lake and Trumbull County.

Q And when she said under epidemiology there's a synergy and the role of prescription opioids extends even into that third column, you are not an epidemiologist to fuss with her over that, are you?

A Sir, the third column would be the people who died of heroin.

Q Right?

A You agree with that, sir?

Q Yes, sir.

A Okay. I have already accounted for the people who may have gotten onto heroin as a result of being on prescription opioids through the indirectly attributable number, which is row C.

So to the extent that we have people getting on heroin because they used a prescription opioid, I accounted for that using her number in row C.

Q I'm not fussing with you.

A Okay.

Q I think you have.

A Okay.

Q But what you haven't accounted for is epidemiological synergy in those people who died that didn't transition --

A I don't understand, sir, how you can have synergies for dead people, so sorry for -- I don't -- I don't -- you just have to explain it to me, sir. I'll catch up to you, sir, I'm trying to understand.

Q Let me give you a hypothetical, see if this will make sense, okay?

Let's suppose that there is a drug dealer who's an illegal heroin drug dealer that's importing the stuff from Mexico, and he's going to find a place to sell it, okay?

A Okay.

Q He's got a choice. He can set up his criminal enterprise and sell this heroin in a county where nobody's really opioid addicted --

A Correct.

Q -- or he can sell it in an opioid-rich environment where you've already got a demand market, and he can put his minions there and they can sell it within that opioid-rich environment. You understand the difference in those two options?

A Absolutely.

Q And do you see how from an economist perspective the business model that that criminal might choose is to go where there's already an established marketplace and put his dealers on the street there?

A Absolutely.

Q Thank you.

Last stop, concerns. And these are my concerns about what you've testified to, your model, if you will.

First of all, your Shapley model says that they all get equal shares if it's simultaneous, right?

A If it's simultaneous and all equally essential.

Q All equally essentially and simultaneous, right?

A Yes, sir.

Q In this case they're not simultaneous, true?

A Yeah, I think there's strong reasons to think it may not be simultaneous in this case.

Q Well, not strong reasons to think. If you're blaming the FDA for approving the drug in the first place, that's got to be done before the doctors write the prescription before the pharmacies sell the drugs, right?

A Yes.

Q So your application model fails at that level, it's not simultaneous, true?

A It may not be simultaneous. I did not see direct evidence from plaintiffs' experts that it was sequen- -- I

had evidence -- I'm sorry -- that it was sequential. I didn't have evidence on who would be 1, 2, 3, 4, 5, so I think we can agree, sir, that manufacturers and the federal government move, as you said before, prescribers and dispensers, but I didn't really know who moved first.

Q This is sequential, though. It's not simultaneous where they all get equal shares, true?

A Yes. If it's sequential they would not all get equal shares, that is true.

Q Now, your argument there is, yeah, but if they're the last link in the chain, they would get even a lesser share, so you're being ultra conservative by using the model in a way it was not written up to be used, right?

A That's right.

Q Now, in that regard, the Shapley value and you submit in a legal proceeding has been written up by Ferey and Dehez in a document that I don't know the number of, so I'd better not display it yet. It's in your report, though, this is your referenced article, isn't it?

A Yes, sir.

Q And we're going to call this Demonstrative 18, Plaintiff Demo 18, and this is your article that talks about whether or not you can use a Shapley value in a multiple causation system in the courts, correct?

A That's correct.

Q And --

MR. WEINBERGER: We didn't see it on the screen.

MR. LANIER: I'm sorry. Thank you, Pete.

BY MR. LANIER:

Q Multiple causation, apportionment, and the Shapley value. An article by F-E-R-E-Y, Ferey, and Dehez, D-E-H-E-Z. This was in the *Journal of Legal Studies*, January of 2016, true?

A True.

Q And you readily recognize and know that this application of game theory is novel in the courts, correct?

A I don't know, sir.

Q Well, but note number 2. "Surprisingly enough, the theory of cooperative games and solution concepts has never been elaborated in the law and economics literature to analyze multiple causation issues."

Do you see that?

A Yes.

Q So the very cite that you use in your report for his Honor is one that betrays that this is novel, your approach in a courtroom, right?

A If they say so, yes.

Q And the game theory approach is a little bit different in terms of its motivations. As we read right above that

footnote, "Contrary to law and economic models in the literature, we are more interested in the fairness of the apportionment than in the incentives created by the apportionment rules. Therefore, we consider causation from an ex-post perspective once the damage has occurred, not from an ex-ante perspective."

Do you see that?

A I do, sir.

Q You understand that the law actually has an incentive behind it, right?

MR. MAJORAS: Objection, Your Honor. This gets into a big legal fight about the nature of the abatement remedy. It's not appropriate for examination.

MR. LANIER: I'll do it this way, Your Honor.

THE COURT: I'm going to sustain the objection the way the question was asked.

MR. LANIER: I'll do it this way.

BY MR. LANIER:

Q Before we do that, this article that's talking about applying apportionment in a Shapley value is an article that also assumes equal culpability, doesn't it?

A No, sir. He's just illustrating a variety of different adjudications, so there is going to be the setting that I invoke, equal culpability, so the exact setting that I invoke you've got multiple causation and each tortfeasor

is equally essential, and then you get, you know, the divide by the number of actors rule.

So they go through that, but then they also talk about how a judge might use different weights, if the judge has more information than the economist analyzing the problem at hand.

Q And that's what I'd like to underscore, please, sir, so let's do it in Q and A form.

"To apprehend the notion of an unobjectionable adjudication, we construct a game with transferable utilities -- called a liability game -- whose characteristic function precisely measures the potential damage caused by any subset of tortfeasors, capturing successive causation, if any."

This is sequential, right?

A This is sequential yes, sir.

Q He says -- and this is the one that you say you didn't use because, A, you didn't have enough data to, you don't know enough to; and B, you said it would automatically reduce the share, remember?

A Yes. It would reduce the share, counsel, if the dispensers come later in the chain.

Q He says, "We show that the core of the liability game defines the set of all unobjectable adjudications and that the systemic Shapley values defines a fair compromise in

which tortfeasors differ only in the amount of damage they caused."

Do you see that?

A Yes.

Q And then specifically says, "A judge may depart from that fair compromise by assigning weights to tortfeasors to reflect misconduct or negligence."

Do you see that?

A Yes.

Q So, in other words, it's not fair for you to say to the judge that this game theory, which if it's applied would automatically mean that the end of the chain bears less responsibility than the front of the chain, that's not an automatic, is it?

A The judge could disagree with that, sir, yes, absolutely. It's not an automatic.

Q Well, it's not just the judge could disagree with it, the judge is being told that he may depart from that by assigning weights to reflect misconduct or negligence.

Do you see that?

A Correct, but it also does say that the judge is departing from fair compromise, so the judge is being, therefore, in my reading, unfair.

Q Well, sir, let's just use a basic example.

Here's your hypothetical. In this hypothetical you've

got the FDA first. The FDA approves a drug, all right? You with me?

A Yes.

Q And it's a good drug, it's got certain uses. It just can be subject to abuse as well, right?

A Yes.

Q You with me?

A Yes.

Q All right. And then you take this abuse -- this drug that's been approved, and the manufacturers, for lack of a better word, seduce doctors into writing prescriptions.

Bad deed, right?

A Yes.

Q And I use the word "seduce" because I'm trying to imply badness to the deed there.

A Yes.

Q And then the doctors write the prescription. Now some doctors write it because they believe the seduction. You follow me?

A Yes.

Q Some doctors write it even though they know the truth, but they don't care because they're all about the money. You got it?

A Okay.

Q Same link in the chain, but different culpability,

right?

A Yes.

Q Now, the chain continues, and you've got some pharmacies that sell the prescription, and they do so violating the law knowing full well the damage that can be caused, having already been fined in other jurisdictions for what they've done, and they're at that end of the chain. You with me in this hypothetical?

A Yes, sir.

Q Now, in this hypothetical, you're telling the judge that under game theory, what the judge is supposed to do since these are sequential, they didn't all happen at the same time, the judge should assign the highest culpability to the FDA and the lowest to the pharmacy. That's the result of your analysis but for that saving clause that I just talked about, right?

A Just to be clear, sir, I didn't do the sequential analysis.

Q No, you didn't. But you said the reason you didn't is, A, you don't have enough expertise or experience, and B, you said it would be much worse for the plaintiffs than the one I did?

A Yes.

Q But that's not true, that's all I'm driving at here. It's not true that this always gets the lowest if you do

sequential, is it?

A Well, if you bring in more information as you have, sir, as you have brought in more information than a pure sequential model, you have introduced two different types of script writers, those who believe the seduction, those who know the truth; you've brought in the fact that it's not just pharmacists selling but they're violating the law and that they've been fined in other context. That is all information, sir, that the judge, Judge Polster and other judge might know. And so that judge might decide, hey, I don't want it to be the case that I'm going to give the maximum penalty to the manufacturers. I'm going to share it between the manufacturers and the prescribers.

That is I think where the cooperative game theory and the discretion of the judge come together perfectly.

Q That's also where your chart and your numbers fail miserably, isn't it?

This attribute 20 percent is based upon simultaneous, and it is not what the evidence is in this case, true?

A You could -- it's a framework, it's a methodology, sir, and so you could change Step 2 to invoke a sequential framework. That is the beauty of the framework. You can apply the framework as you see fit, sir.

Q And so if the judge applies the framework where he decides instead of 66.2 and 60.7 percent, that synergy of

epidemiology, which is the only epidemiology testimony in this case, is that it's north of that, perhaps anywhere, who knows, but that you've got the synergy column that's been left out, and if he decides that culpability is relevant and so the 20 percent might be much higher, then all of a sudden you're in a radical different world before you even begin to look at defendants' individual shares, true?

A True.

Q And individual shares of the defendants, you can't base that upon which drugs went to which victims or people that caused what problems because you don't have that data either, do you?

A No, sir. I relied on plaintiffs' experts for all of that data, but you raise a really good point, sir. I -- I didn't do this in my report, but I always thought that you could in theory find folks who need society's help, who need our help, and you could look at where they filled their scripts, sir. You could look at -- did this person get their scripts at a CVS in the past three years or past four years?

And so you could directly help people -- that's not -- that's, sir -- that's not what I'm doing here, but if I had the data to do that, we could do that.

Q So with all due respect, though, that's not the whole picture. We got a situation where kids are getting addicted

because they grab prescription drugs from their grandparents' or someone else's medicine cabinet and take them to school, and we don't know who overprescribed or overfilled prescriptions for that. You understand?

A That's why I wrote the report I did, sir. It's for exactly that reason.

Q All right. So last two analogies, and then I'll sit down.

I'm trying to draw a house. You've just got to agree with me that's a house, okay?

A Okay.

Q Now, I want you to understand that this house here -- I put a window in it so it looks like a house.

I want you to understand that this house has got a window busted out, all right? And that happened first, the window got busted. You tracking with me?

A Yes, sir.

Q And then another window gets busted over here, so you have a second window busted. You with me?

A Yes, sir.

Q And then right back here where the eave is, some of the shingles have gone bad and you've got a little crack up in the roof barrier, so there's a crack in the roof. You with me?

A Yes, sir.

Q And that's number 3.

And then number 4, somebody drops something and creates a huge hole in the roof and you've got a huge hole.

Number 4. Are you with me?

A Yes.

Q Now, let me show you what happens. It starts raining. It's a driving rain coming in off the lake.

You with me?

A Yes.

Q Some of the rain gets in through the first window, and some of the rain gets in through the second window. Some of the rain gets in through the crack. And a bunch of the rain gets in through that big ol' hole. And that water winds up flooding out the house.

You with me?

A Yes.

Q Now, you would try to assign causation here by your model and say if all four of those things happened at the same time, they're all equally responsible for the water damage, right?

A Right.

Q But if they happened in a sequential order, you say that that kid who hit the baseball in and busted the first window out gets the highest, and the big hole that was formed when -- I don't know how you get a big hole in the

roof, but however -- you know, a meteor hit it -- the big hole gets the lowest.

That would be the application of the model as you testified to it, correct?

A Incorrect, sir.

Q But for the fact that the judge has discretion to look at culpability, right?

A I disagree, sir.

Q Okay. Fine. I'm going to give you my second analogy, and then I'm going to close. See if you'll agree with this one.

We are in a courtroom, and his Honor sits underneath the seal as the judge. You with me?

A Yes, sir.

Q And I suspect on a regular basis he has standing before him criminals that he has to assign culpability to as he sentences them.

You tracking with me?

A Yes, sir.

Q And if he's got five criminals that all work together in an enterprise, he doesn't automatically just sentence them each to 20 percent of the sentence --

MR. DELINSKY: Judge, I object.

Judge, you and I know quite well that sentencing in federal court are guided by the United States Sentencing

Guideline. It's a completely different calculus.

MR. LANIER: I've made my point, Your Honor, I'll pull the question down.

BY MR. LANIER:

Q The point is, regardless of the format, game theory is not always -- you've never seen it used in a courtroom before, have you?

A I don't know. I have not. But that doesn't mean that has not been used.

MR. LANIER: Thank you, sir.

Thank you, Your Honor.

THE COURT: Let me ask you this because I know you have a little one at home. There used to be -- when I was young, there was flights every hour between Cleveland and Boston. I think there are two a day. Is there one that you could get back home tonight if we stay? If so, if it's not going to be too long, we will. If not, we'll just wrap up tomorrow morning.

THE WITNESS: I would love to be wrapped up tonight, sir, if that's possible, but I'm happy to stay the night as well, sir.

THE COURT: Well, let's see -- I want to find out from counsel how much time we --

MR. DELINSKY: Your Honor, I probably have about ten minutes.

MR. LANIER: And I promise you, I'll go on the record right now and say I will reduce mine down to 20 percent of whatever he takes. He takes 10, I'll take two. Hold me to it.

THE COURT: That's fine.

MR. DELINSKY: Thank you, Your Honor.

THE COURT: Well, I used to have young kids. Now I have grandkids. But I know what it was like, and I tried to get home if I could.

(Pause in the proceedings.)

REDIRECT EXAMINATION OF AMITABH CHANDRA

BY MR. DELINSKY:

Q Dr. Chandra, this is off my clock, so you got to help me here a little bit, okay?

A Okay.

Q This Step 1 part of your analysis involving the mortality computations.

A Yes, sir.

Q Am I right that you used Dr. Keyes's mortality analysis for Step 1?

A I did.

Q It wasn't your mortality analysis?

A No, sir.

Q You are not endorsing the concept of indirectly attributable -- deaths indirectly attributable to opioids,

correct?

A I am not.

Q But you use it because it's Dr. Keyes' analysis?

A Yes.

Q Mr. Lanier asked you about your choice of 2019 mortality data that Dr. Keyes has used, correct?

A Yes.

Q You selected 2019 from Dr. Keyes' analysis?

A Yes. I did, sir.

Q Was that because it was the most recent year in Dr. Keyes' analysis?

A Yes, it was.

Q Okay. With regard to the synergy questions, are you endorsing the idea that a pharmacy chain can be liable for an illegal drug market?

A I'm not.

Q The article on Shapley's value that Mr. Lanier showed you, okay? Do you recall that?

A Yes, sir.

Q That article concerned the application and use of Shapley's value in lawsuits, correct?

A That's correct, sir.

Q What publication was that article in?

A The *Journal of Legal Studies*.

Q Is that a good publication, a bad publication, an

authoritative publication?

A It's one of the leading publications in the journal -- in the field of law and economics. It's edited out of the University of Chicago, sir.

Q Is that a peer review journal?

A Yes, it is.

Q So is that article subject to peer review?

A Yes.

Q Did you cite that article in your report?

A I did, sir.

Q Did you cite that article -- I have footnote 8 -- page 7, footnote 8?

A Yes, sir.

Q Is this where you cite the article in your report on page 7 of your report?

A Yes, sir.

Q Okay. Mr. Lanier asked you if you've ever seen an application of Shapley's value or what's discussed in the peer-reviewed article we just discussed in the courtroom, do you recall that?

A Yes.

Q How many times have you been in a courtroom?

A Only once before, sir.

Q Are you the right person to ask whether it's been applied in the courtroom before?

A I would really not know.

Q Is Shapley's value a recognized and generally-accepted principle in your field of health economics?

A Yes, sir. It's in every -- it's in the foundational economics textbook that I also cite in footnote 8. That's the textbook that we all learn from when we're training to become little economists. So Shapley's value is in that -- it's part of the standard canon, in other words.

Q Do you actually teach Shapley's value to your students?

A Yes, I do. I teach a particular application of it to my students.

Q Now, I'm going to show you an excerpt of trial testimony from Dr. Alexander, okay?

And I'm putting together two pages, okay?

"You did list out to the Congress what you believe were the major causes of the opioid epidemic: Manufacturers, the FDA, and the DEA.

"You did not in any of your testimony mention pharmacies in any way."

Do you see that question to Dr. Alexander?

A I do.

Q Dr. Alexander then responds, "I believe that may be true."

Do you see that answer?

A You may have to move the document up, sir. I can't see that.

Yes. I see it now.

Q Is this the kind of testimony that you relied on in identifying the set of actors to include in Step 2 of your methodology?

A Yes, sir.

Q Is that the kind of testimony that would support -- if we were to apply a sequential method of Shapley's value -- that would support attaching a higher percentage to the federal government and to the manufacturers?

A Yes, it would.

Q And that's in the record in this case, correct?

A Yes. Yes, it would.

Q Okay. Do you believe, and is it your opinion as an economist, that your application of Shapley's value is the most appropriate application under the circumstances here?

A Given the information that I'm working with, I thought -- I think I believe that it is the most appropriate application.

Q And as an expert in health economics, am I right that you have latitude in determining how to apply Shapley's value in the most appropriate way under the circumstances?

A I agree with that.

Q There's flexibility in applying the doctrine based on

the circumstances, correct?

A Correct.

Q One last point. I'm going to come in under ten, okay? I'd like -- do you have your report in front of you?

A Yes, sir.

Q I'd like to direct your attention to page 17, footnote 47.

Could you please read into the record what you write in footnote 47 on page 17 of your report?

A Yes, sir.

"Another way to approach this would be to start by looking at the people who plaintiffs seek to assist under their abatement plans, and determining through the use of CVS's prescription data which of those persons filled opioid prescriptions at CVS pharmacies and to what degree."

Q Okay. Now, you included that in your report, correct?

A Yes, I did.

Q It's your opinion that that would be an appropriate way to allocate damages or allocate harm in this case, correct?

A That's correct.

Q It's a different form from what you propose, correct?

A Yes. It is different.

Q Okay. And I believe you indicate in the sentence below that the plaintiffs hadn't produced the data you would

have needed in this case to perform that, correct?

A Correct.

Q Now, Mr. Lanier asked you about this potential type of allocation, correct?

A Correct.

Q You think it would be reasonable, correct?

A Yes. It would be reasonable.

Q On a go-forward basis, as people came to receive treatment in the counties, if we could run their names through the pharmacies' data to determine if their prescriptions have ever been filled, do you agree that that would be one of the most precise ways to allocate shares of abatement in this case?

A Let me say this, sir. I like the intuition of that approach, but I would need to know more. I would need to know more about what data CVS has. I would need to know more about a point that Mr. Lanier brought up, about the kids who might not have picked up any prescriptions at the CVS. So there are other determinations that I would need more information about. But as I note in my report, there is another way.

MR. DELINSKY: Okay. Thank you for your time, Dr. Chandra.

I'm going to pass the witness to Mr. Lanier with time to spare.

MR. LANIER: Judge, by my count, I'm allowed one minute and 45 seconds.

We're starting at the end. Go.

RECROSS-EXAMINATION OF AMITABH CHANDRA

BY MR. LANIER:

Q The plaintiffs didn't produce data to look at how these shares could be assigned. That was what you just ended with, right?

What data does the county have that we didn't produce?

A I don't know, sir. I'm speaking as a health economist. I'm trying to think about alternatives to my approach, and I thought that -- if we live in a world with good data, sir, and as you know in this case --

Q You can't run my time out.

A I'm sorry.

Q I'm just asking, what data did we not produce?

A Oh. I didn't see data, sir, where I could link someone with an Opioid Use Disorder today, a new person picking up a script, to whether or not they had picked up, you know, an opioid at a CVS and --

Q You're not suggesting the county has those names and data, are you?

A I don't know.

Q All right. Next question.

Using Dr. Keyes' mortality data, you used one year

instead of five years, and you think that it's better to just use the most recent year instead of a cumulative set of data?

A You could use five years, sir.

Q Next question.

Journal of Legal Studies, did you cite it -- you were asked that question about the Ferey article, right?

A Yes.

Q I mean, that was my whole point. I got it from you.

A Okay.

Q Dr. Alexander listed causes, the manufacturers, the FDA and the DEA, that he testified about that.

You were asked, "Would that cause you to higher a value for sequential game theory assignment."

You said, "Yes."

That doesn't tell you anything about culpability, does it?

A No, sir. This exercise, my report -- and I'm very clear in my report. In fact, I think I say it best in my report itself. I offer no opinion on whether CVS engaged in culpable conduct. So I'm not making statements about culpability here at all, sir.

MR. LANIER: Thank you.

Thank you, Judge.

THE COURT: Okay. Thank you very much,

Doctor, and you may be excused. Safe travels back to Boston.

THE WITNESS: Thank you, Judge Polster.

THE COURT: So that's the final defense witness?

MR. DELINSKY: Your Honor, it is the final defense witness. I'm going to walk Dr. Chandra out. I think we have exhibits to move.

THE COURT: I'm going to suggest -- it's late, and our court reporter's a little tired and stiff, and maybe I am too, so we'll come back tomorrow, we'll wrap up the exhibits.

And then if there's a stipulation on that one document, you can present it. If not, we'll have Miss Caraway for a short testimony on that one document. She'll be the only rebuttal witness, right? Or the plaintiffs have other potential rebuttals?

MR. LANIER: We do have an agreement on the stipulation. I'll represent that to you now, if that makes you feel better about going home tonight.

THE COURT: Well, then why don't we come in at 9 tomorrow, we'll deal with the exhibits, put the stipulation on the record, and then we'll adjourn the hearing and I'll discuss the briefing.

MR. MAJORAS: Your Honor, I'm sorry. Just to

be clear, the agreement of the parties on that county document is that it will come in as is.

THE COURT: Oh, all right. Well, that's fine. That's fine.

MR. LANIER: I agree with John.

THE COURT: We'll include that with the others.

Have a good evening. We'll see you at 9 tomorrow morning.

(Proceedings adjourned at 5:32 p.m.)

C E R T I F I C A T E

I certify that the foregoing is a correct transcript of the record of proceedings in the above-entitled matter prepared from my stenotype notes.

/s/ Gregory S. Mizanin *May 17, 2022*
GREGORY S. MIZANIN, RDR, CRR DATE